Fisher’s Separation Theorem

Underlying Assumptions?

- There are only two points in time - the present time (time 1) and a later time (time 2).
- There is no uncertainty and hence the outcome of all decisions is known to everybody.
- There are no imperfections in the market.
- All decision makers are rational
- The company ‘s managers wish to use the company’s resources according to the wishes of the shareholders.

The analysis involves three participants

- The firm
- The Shareholders
- The Capital Market

Summary

- The significance of the “Fisher’s Separation Theorem” is that the firm and its shareholders are separate.
- The firm ‘s policy should aim to maximise the utility of all shareholders.
- The firm does not consult each shareholder before it makes its decision to invest.
- The company should invest up to the point where the return on the marginal investment equals the interest rate in the capital market.
- It separates the ‘investment decisions’ of management from the ‘consumption decision, of shareholders
**Fisher’s Separation Theorem** provides a consistent set of decision-making rules which could be employed in making investment, financing and dividend decisions.

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**Theoretically:**

To define and consolidate the wealth maximising goal of the firm, to develop and exemplify the NPV model, to define the role of managers and shareholders.

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**Practicality:**

To demonstrate the need to adhere to the NPV model, and to focus on the investment decision as the primary wealth creating decision.

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**THE INVESTMENT DECISION**

Fisher’s Separation Theorem means that a firm can make investment decisions in the interests of every shareholder regardless of differences between shareholder’s preferences.

That is, a firm can make an investment decision with which every shareholder will agree.

Moreover, there is a rule which will identify that decision - a firm should invest up to the point where the net present value of the marginal investment is zero.

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**THE FINANCING DECISION**

In Fisher’s analysis there is a single market rate of interest. In effect, there is no distinction between debt and equity securities, and the cost to the firm of acquiring funds is independent of the type of security issued.

It follows that the value of the firm and the wealth of its owners is independent of the firm’s capital structure.

- **As a result, the financing decision can be described as irrelevant**
The Firm

PRODUCTION / INVESTMENT

ASSUMPTIONS

1. Diminishing Marginal rates of return Exist
2. The investment opportunities have been ranked in order of their internal rates of return, from highest to lowest.
3. Investment opportunities are infinitely divisible.

NOTE ***
Assumptions 1 and 2 induce the convex shape
Assumption 3 leads to the smooth curve

The investment opportunities line shows cash flows from investing in real assets.
INDIFFERENCE CURVES

An individual's preference for consumption at time one or at time two is represented by Indifference curves.

Each combination on the curve gives the same satisfaction as every other combination on the curve

MARGINAL RATE OF SUBSTITUTION

The rate at which the consumer is just willing to substitute consumption in period one with consumption in period two, or vice versa.

The rate diminishes with movement down the curve, reflecting the fact that the consumer is willing to give up less consumption in period two for an additional unit of consumption in period one.

The convex shape of the curve implies that a customer's desire to further increase consumption at a given time decreases as the level of consumption at that time increases.
The firm is unable to reach a decision which will maximize the shareholder's utility. There is no simple decision rule to satisfy all shareholders. Unless there is a capital market.

The slope of an indifference curve at any point shows the consumer's willingness to trade off C1 for C2.

**INDIFFERENCE CURVE**

Any indifference curve represents a higher level of satisfaction than the curves that lie to the left or below it.

The firm faces a dilemma, which owner do they please as there is no one unique point of production which maximizes the happiness of all owners.
The capital market can be thought of as a place where current resources may be transformed into future resources, and vice versa, at a constant rate, \( [1] \), per period.

**EQUATION**

\[
W_1 = C_1 + \frac{C_2}{1 + I}
\]

**WHERE**

- \( W_1 \) = Wealth at time one
- \( C_1 \) = Income at time one
- \( C_2 \) = Income at time two
- \( I \) = Constant interest rate for transformation

If an individual is able to reach any point on this line, then by borrowing or lending, all other points on the line are also available.

Today's dollars can be exchanged for dollars in the future (LENDING) and future dollars exchanged for today's (BORROWINGS)

By exchanging dollars through time we are more able to match money available to us with our desired consumption pattern.

In a perfect capital market there will be only one price, or interest rate, which equates the supply of funds available for investment with the demand for funds.

This will be a risk free rate, given the assumption of certainty of future outcomes.
**INDIFFERENCE CURVE**

- Function of the firm's
  - a) Financing Decisions
  - b) Investment Decisions
  - c) Asset Management Decisions
  - d) Dividend Decisions

**FIRM'S OPTIMAL INVESTMENT**

The firm's optimum investment decision is that which maximizes the firm's wealth. By maximizing the present value of dollars flowing from the investment decision.

Wealth is maximized by employing either:

- a) Internal Rate of Return rule
- b) Net present Value rule

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**Time Two**

To make the consumption / investment decision that maximized the firm's utility -

1) The firm chose that amount of investment that would maximize the firm's wealth. (By use of either the N.P.V. or I.R.R. Rule)

   [It exchanged its current endowment of $12m now, for $6m now, and $8.9m later, by investing $6m]

2) The firm identified its optimum consumption pattern, $8m now and $9.9m later. This was achieved by consuming $8m now and borrowing $2m in the Capital market.
Fisher's Separation Theorem can be traced to the work of Irving Fisher and is widely regarded as laying a foundation for many fundamental results of financial theory.

Answer the following specific questions on the Fisher Model with short comments.

**What is the role of this model (in corporate decision making)?**

FSTM provides a consistent set of decision-making rules which could be employed in making investment, financing and dividend decisions.

Theoretically: to define and consolidate the wealth maximising goal of the firm, to develop and exemplify the NPV model, to define the role of managers and shareholders.

Practically: to demonstrate the need to adhere to the NPV model, and to focus on the investment decision as the primary wealth creating decision.
What are the model's underlying (4) assumptions?

The four underlying assumptions of the model are
1. There is no uncertainty, and hence the outcome of all decisions is known now to everybody.
2. There are no imperfections in the capital market
3. All decision makers are rational
4. The company’s managers wish to use the company’s resources according to the wishes of the shareholders.

How and why is the production possibilities curve depicted on the model?

As a continuous curve with a declining slope from right to left to shows that investments can be ranked in order of declining return and so able to be selected by management. (It is not an algebraic function).

Is it possible to draw the possibilities curve as an algebraic function?

No, because this represents actual real rates of return from real assets. It is empirically derived.

What is the significance of the ‘Separation Theorem’?

The significance of the “Fisher’s Separation Theorem” is that the firm and its shareholders are separate. The firm’s policy should aim to maximise the utility of all shareholders. The firm does not consult each shareholder before it makes its decision to invest. The company should invest up to the point where the return on the marginal investment equals the interest rate in the capital market. It separates the ‘investment decisions’ of management from the ‘consumption decision, of shareholders.

How does the Fisher Model relate to the ‘nexus of contracts’ idea in corporate decision-making?

Fisher’s firm is simply a pool of funds which allows the recognition of an asset set. This idea, together with, the Separation Theorem reinforces the nexus of contract idea.

Draw smaller Fisher diagrams to depict the following scenarios, and explain what happens.
The firm has insufficient capital available to undertake all investments.

Extra capital is raised in the market place (firm borrows extra funds from A to B to finance all viable investments)

**More than sufficient assets are purchased**

Firm’s wealth falls from D to C because of investment in poor assets NPV is reduced because some assets produce negative NPV?

**Interest rates rise during the investment decision process**

The point of optimum investment will fall hence the firm will invest in fewer assets whose NPV is positive. Investments that had positive NPVs at the lower interest rate will now have negative NPVs and this leads to a decrease in investment and overall NPV.