



# The MM Theorems: A Cornerstone of Corporate Finance

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# || A “cornerstone”

- Franco was aware that the MM theorems were a fundamental contribution.
- Hard to disagree:
  - today *no* course in corporate finance starts without explaining MM;
  - it has affected the *entire* development of research in the field.

# Two reasons

1. **Substantive**: MM provided a crystal-clear *benchmark* case where capital structure decisions and dividend policy are *irrelevant*.
2. **Methodological**: MM made their case using formalized reasoning, and specifically an *arbitrage* argument.

# 1. Benchmark value of MM

- Surprising finding (at the time): key financial choices are *irrelevant*.
- Virtue of this finding: it forces us to think of the reasons why these choices may be relevant.

In Miller's own words: "showing what *doesn't* matter can also show, by implication, what *does*."

# Assumptions in MM

1. No taxes.
2. No bankruptcy costs.
3. Perfect financial markets:
  - competitive,
  - frictionless,
  - no informational asymmetry.

# || The two MM theorems

- Irrelevance of capital structure: under these assumptions, the value of a company  $V$  (market value of equity + debt) is unaffected by its leverage.
- $V = \text{PDV}$  of the company's cash flow, discounted at the required return for the relevant "risk class".
- Average cost of capital also unaffected by leverage.
- Irrelevance of dividend policy: under the same assumptions, the value of a company is unaffected by its payout ratio.

# ||| Relaxing the MM assumptions

The **entire development of corporate finance** since 1958 (publication of the first MM article) can be seen as the sequential or simultaneous **relaxation of the 3 assumptions in MM.**

# ||| Relaxing MM assumption #1

1. **Taxes:** the first to go, at the hands of MM themselves.
  - Preferential tax treatment of debt → optimal capital structure would require much more leverage than that observed in U.S. companies.
  - Later (important) refinements: take into account differential personal taxation of interest income, dividends and capital gains → drastic downward revision in estimate of optimal leverage.



# || Relaxing MM assumption #2

2. **Bankruptcy costs:** seen by many as the *counterweight* to the tax advantage of debt.
  - They allowed to derive **internal** optimum leverage.
  - But are these costs empirically large enough to explain observed outcomes?

# || Relaxing MM assumption #3

3. **Market imperfections:** main imperfection considered in the literature arises from **asymmetric information** between company managers and outside investors.

Removing this assumption kept us busy in corporate finance for the last 40 years or so.

# Relaxing MM assumption #3 (cont'd)

With **asymmetric information**, capital structure matters for 2 reasons.

Different financial instruments:

- generate different *incentives* for company insiders  $\Rightarrow$  different effects on moral hazard (e.g. risk shifting, private benefits of control);
- have different *ability to convey* the *information* of company insiders  $\Rightarrow$  different effects on adverse selection issues.

## 2. Methodological value of MM

- Introduced **formal reasoning** in finance (together with portfolio choice theory by Tobin, Markovitz and Sharpe).
- More specifically, introduced method of **proof by arbitrage** – more general and compelling than competitive equilibrium. Later extensively used in asset pricing, especially for derivatives.

# MM's "laborious" proof

- Compare firm A and B in the same "risk class".
- Suppose firm A has greater leverage and is worth more than B.
- Investors can replicate A's capital structure by mixing B's shares and "homemade leverage".
- This synthetic asset costs less than A but is otherwise identical → arbitrage profit.

# Now we know that ...

- ... for the arbitrage proof we don't need :
  - to compare two firm in the same “risk class”;
  - to assume that “homemade leverage” at the same interest rate as that of the companies.
- Arbitrage → linear pricing rule for cash flows  
→ price of cash flow of debt + price of cash flow of equity = price of total cash flow =  $V$ .
- Can prove MM also within general equilibrium model instead of arbitrage.

# Empirical work by MM

- Less durable part of the MM legacy: it focused only on taxes. Now we know that the picture is more complex than that.
- But also Franco's empirical work in finance contains two memorable lessons:
  - the passion to relate theory to facts, and to **question/readjust the theory** accordingly;
  - the willingness to consider **no assumption as "sacred"**, including individual rationality.

# Overall lessons of Franco's research style

- Franco's lesson goes beyond his two greatest contributions: MM theorems and the life-cycle theory of saving.
- It is a lesson regarding “research style”:
  - **no boundary between macro and finance;**
  - research must not lose sight of **real-world policy issues.**
- Had we followed in his footsteps, we would have been collectively better equipped to deal with recent financial crises.