

Markets: Trading

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FINM Intro: Markets

Exchanges and Clearing

Leverage

Optimizing leverage

Outline

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Trading methods

Exchanges

- ▶ Contracts on an exchange are standardized.
- ▶ This increases price transparency; decreases transaction costs.
- ▶ Exchanges remove most counterparty risks through margin requirements.

Over-the-counter (**OTC**)

- ▶ Can handle non-standard contracts.
- ▶ Parties can use contracts customized to needs.
- ▶ Downside is that they involve counterparty risk. Thus, the use of collateral.

Data: OTC vs exchange volume

	Notional amount outstanding (\$ billions)	
	OTC	Exchange
Interest rate	384,025	63,078
Equity	7,141	7,296
Currency	70,446	368
Total	461,612	70,742

Table: Notional values of worldwide OTC derivatives contracts, as of 2015. Categorized by type of underlying security. Of course, market value is much smaller.

Source: BIS. 2015.

Prominent exchanges

Stocks

- ▶ For the U.S.: New York Stock Exchange (NYSE) and NASDAQ.
- ▶ Outside U.S.: Tokyo, Euronext, and London.

Options and futures:

- ▶ Options are traded electronically on the International Securities Exchange.
- ▶ The largest physical exchange is the Chicago Board Options Exchange (CBOE).
- ▶ For futures, the Chicago Board of Trade (CBOT) and Chicago Mercantile Exchange (CME) have now merged.

OTC and credit risk

During the 2007-2009 financial crisis, counterparty default in OTC markets surged.

- ▶ Fear that large failures represented systemic risk, as defaults could transmit through many counterparties.
- ▶ Lehman is an example of the danger in OTC market counterparties.

Clearing to reduce risk

To reduce systemic risk, many governments now require **central clearing parties (CCP's)** in OTC markets.

- ▶ Particular focus on CDS and futures markets.
- ▶ Mandated clearing of "standard" OTC derivatives. Had been mostly bilateral deals.
- ▶ Does not address the issue of nonstandard contracts, such as those which caused problems for AIG.

Additionally, regulation has moved some OTC trading to exchanges.

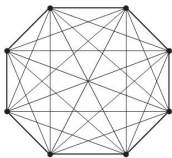
Central clearing

CCP's reduces counterparty risk relative to bilateral OTC transactions.

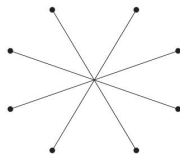
- ▶ Buyers and sellers must transact with a clearing party.
- ▶ The clearing parties set aside some money in case of defaults.
- ▶ The clearing parties also require a margin account which can cover a 1% VaR on the net position the party has with the CCP.

Options Clearing Corporation (OCC) is an important CCP.

Central clearing v.s. Bilateral trading



Bilateral Clearing



Clearing through a single CCP

Figure: Source: Hull (2012)

Margin accounts

For centrally cleared markets, the buyer and seller must deal with a clearing party member.

- ▶ When a contract is entered, the purchase price is deposited in a margin account.
- ▶ Each day, the margin account is updated to reflect changes in the value of the underlying contract.
- ▶ Margin account changes are passed along through the clearinghouse to the counterparties.

Margin calls

Margin accounts pay interest, or often securities are deposited instead of cash (at a haircut.)

- ▶ If the contract decreases, and the margin account drops low enough, (often 75% of the initial margin,) then there is a margin call.
- ▶ At this point, the investor must deposit new funds to raise the margin account back up. Otherwise, the position will be closed.
- ▶ If the contract increases in value, the excess margin funds can be withdrawn.

Financial stability

In futures contracts, the system was tested on Black Monday, October 19, 1987.

- ▶ S&P 500 futures declined 20%.
- ▶ Even then, all short positions were paid.

Buying on margin

Brokers' call loans are an important source of financing for investors.

Buying securities using these loans is referred to as **buying on margin**.

- ▶ Instead of paying the full price to the broker, the investor pays only a portion, or margin. The rest of the purchase price is borrowed from the broker.
- ▶ The securities serve as collateral on the loan.
- ▶ If the security value falls enough to put the broker's money at risk, a margin call is issued.

The Federal Reserve currently limits initial margins to 50%.

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Leverage

Leverage refers to how much of the firm's capital comes from equity holders versus debt holders.

Two popular balance-sheet measures of leverage:

$$\text{Debt-to-assets} = \frac{\text{Liabilities}}{\text{Assets}}$$

$$\text{Debt-to-equity} = \frac{\text{Liabilities}}{\text{Equity}}$$

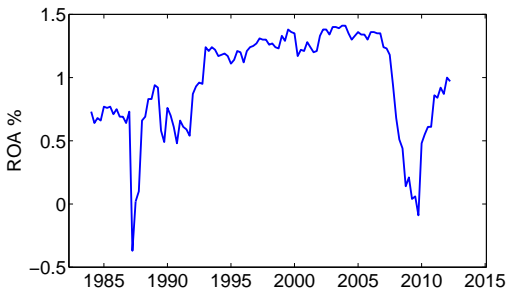
Understanding ROE

The *DuPont identity* decomposes return-on-equity (ROE) into the return-on-assets (ROA) scaled by leverage.

$$\text{ROE} = \underbrace{\frac{\text{Earnings}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}}_{\text{ROA}} \times \frac{\text{Assets}}{\text{Book Value of Equity}}$$

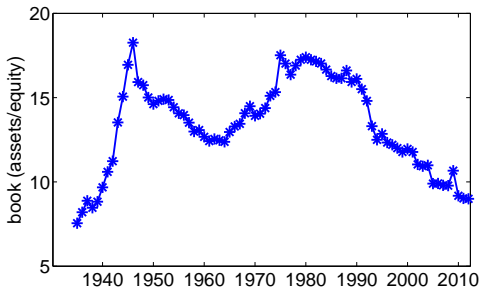
Net Profit Margin
Asset Turnover
Leverage

Data: Return on assets for commercial banks



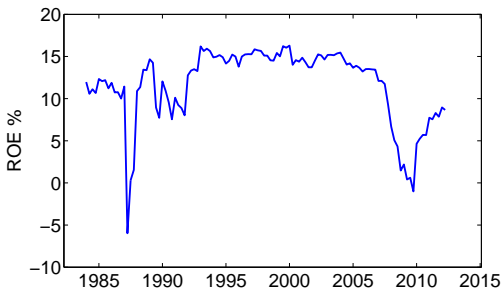
Source: FRED (USROA)

Data: Leverage of commercial banking sector.



Source: FDIC (CB14)

Data: Return on equity for commercial banks



Source: FRED (USROE)

Table of ROE

	Return on Equity (ROE) (%)	=	Profit Margin (P) (%)	×	Asset Turnover (A) (times)	×	Financial Leverage (T) (times)
Adobe Systems	15.6	=	22.9	×	0.55	×	1.23
Chevron	24.2	=	8.7	×	1.44	×	1.93
Florida Power and Light	11.5	=	7.2	×	0.48	×	3.31
Genentech	22.3	=	22.8	×	0.63	×	1.57
JPMorgan Chase	12.5	=	13.2	×	0.07	×	12.68
Merck	18.0	=	13.5	×	0.50	×	2.66
Netflix	15.5	=	5.6	×	1.86	×	1.50
Norfolk Southern	15.1	=	15.6	×	0.36	×	2.69
Safeway	13.3	=	2.1	×	2.40	×	2.63
Scotts Miracle-Gro	23.7	=	3.9	×	1.27	×	4.75

Figure: ROE for various firms, 2007. Source: Higgins (2009)

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Leverage tradeoff

Leverage decisions must take account of the pros and cons of debt financing.

- ▶ A firm does not pay taxes on income used for interest payments.
- ▶ This *debt tax shield* incentivizes firms to lever up.
- ▶ However, more debt increases the chances of financial distress or bankruptcy.
- ▶ Optimal leverage balances these forces, and varies widely across industries.

Not surprisingly, low leverage is used in industries where financial distress is particularly costly.

Leverage - coverage measures

There are many other ways to measure the extent to which a firm is financing with debt.

- ▶ Bankruptcy is caused by defaulting on payments, not on the share of equity versus debt.
- ▶ Thus, measures based on cash-flow are often preferred.
- ▶ **Interest coverage**, or **times-interest-earned**, measures the financial risk of a firm.
- ▶ It shows how much burden interest payments are on the cash flows.

$$\text{interest coverage} = \frac{\text{EBIT}}{\text{interest expense}}$$

Rollover risk

There are many other ways to measure the extent to which a firm is financing with debt.

- ▶ **Times burden covered** is similar to times interest earned, but takes account of principal repayment.
- ▶ Relying on the interest covered measure assumes that one can roll over the debt principal.
- ▶ In the summer of 2007, many investors in MBS found this is not always the case.
- ▶ Times burden covered is conservative in that it calculates as if all principal will be repaid.

Leverage in the crisis

Leverage played a big role in the recent financial crisis.

- ▶ Firms such as Lehman and Merrill Lynch had 30-to-1 leverage.
- ▶ This left them very little flexibility to deal with asset declines.
- ▶ The total decline in mortgages was a relatively small amount of money, but was more than enough to bankrupt highly leveraged institutions.

Capital requirements

Capital requirements are meant to keep financial institutions from taking too much risk.

- ▶ Note that with high leverage, a firm has more incentive to take very large gambles.
- ▶ Losses mean little, while the upside from the gains gets larger.
- ▶ Regulators want to prevent excess risk which could cause failure in financial markets.

Leverage ratio requirements

The capital requirements take two forms: the first is based on the leverage ratio.

- ▶ A bank is well capitalized with a leverage ratio below 20.
- ▶ But extra regulation kicks in if it goes above 33.
- ▶ The FDIC must take steps to close down a bank with a leverage ratio above 50.

Basel

The second type of requirements are risk-based.

- ▶ Under regulation known as the Basel Accord, banks were required to hold 8% of their risk-weighted capital.
- ▶ The weighting system for capital leads to regulatory arbitrage.
- ▶ Basel 2 was very recently rolled out after many years of planning. However, due to the crisis, Basel 3 is already being studied.

References

- ▶ Berk, Jonathan and Peter DeMarzo. *Corporate Finance*. 2011.
- ▶ Bodie, Kane, and Marcus. *Investments*. 2011.
- ▶ Cochrane, John. *Understanding Policy in the Great Recession* European Economic Review. 2011.
- ▶ Higgins, Robert. *Analysis for Financial Management*. 2009.
- ▶ Hull, John. *Options, Futures, and Other Derivatives*. 2012.
- ▶ Mishkin, Frederic. *Money, Banking, and Financial Markets*. 2010.