Short-Selling + Limits to Arbitrage

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BUSI 448: Investments

Where are we?

Last time:

- Leverage
- Margin
- Repurchase agreements

Today:

- Short-selling and margin
- Equities lending
- Limits to arbitrage
- Short-selling regulation

Short-selling

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Short-selling

- It is possible to sell before you buy.
- You need to borrow the asset you want to sell and return it later.
- This is called selling short or shorting.
- Hope is to reverse order of “buy low-sell high” maxim

Some jargon:

- Long = own something (asset)
- Short = owe something (liability)
- Cover = buying asset after shorting

Example #1

- Borrow and sell 100 shares of ABC, trading at $60
- ABC drops to $40 and you buy back and return the shares (cover the short).
- You bought at $40 and sold at $60, so you made $20 per share.
- Risk is that ABC ↑ and you have to buy back at more than $60

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Margin requirements

- The risk in short-selling is a price *increase*
- Brokers require the cash proceeds and additional margin as a buffer against this risk.
- Reg T: accounts must have 150% of short sale value at initiation
  - 100% comes from the short proceeds
  - add'l percent margin = $\frac{\text{Equity}}{\text{Value of Short Position}}$

Margin example: short position

Initial balance sheet

Assets		**Liab/Eq**	
Short Proceeds	6,000	Short ABC	6,000
Margin Assets	3,000	Equity	3,000
Total	9,000	Total	9,000

$$\text{Percent Margin} = \frac{3,000}{6,000} = 50\%$$

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Margin example: short position

Suppose price rises to $70:

Assets		Liab/Eq	
Short Proceeds	6,000	Short ABC	7,000
Margin Assets	3,000	Equity	2,000
Total	9,000	Total	9,000

$$\text{Percent Margin} = \frac{2,000}{7,000} = 28.6\%$$

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When does a margin call occur?

A margin call occurs when:

$$\frac{\text{Equity}}{\text{Value of Short Position}} < \text{Maintenance Margin}\,.$$

- This occurs when ABC's price rises, increasing the short-seller's liability.
  - They need to buy the share back in order to return it!

When does a margin call occur?

- S_0 = initial stock value
- A_0 = initial assets (short proceeds + margin assets)
- MM = maintenance margin percentage
- r = stock return

A margin call occurs when:

$$\frac{A_0 - S_0(1+r)}{S_0(1+r)} < MM\,.$$

Solving for r:

$$r > \frac{A_0}{S_0(1+MM)} - 1.$$

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Margin call example

Initial balance sheet

Assets		**Liab/Eq**	
Short Proceeds	6,000	Short ABC	6,000
Margin Assets	3,000	Equity	3,000
Total	9,000	Total	9,000

For maintenance margin of 30%, a margin call occurs if stock return is greater than:

$$\frac{9,000}{6,000(1+0.3)} - 1 = 15.4\%$$

Relative performance

Sometimes short to bet on **relative** performance.

Another Example:

- Suppose you are optimistic that Chevron will outperform other energy companies, but not sure what price of oil will do.

Strategy: buy CVX and short XOM or energy company index (e.g., XLE).

Example

- Initial capital to invest of $10,000
- Buy $10,000 of CVX and short $10,000 of XOM.

Assets		Liab/Eq	
CVX	10,000	XOM	10,000
Cash	10,000	Equity	10,000
Total	20,000	Total	20,000

Example (cont'd)

Suppose CVX ↑ 30% and XOM ↑ 10%

Assets		Liab/Eq	
CVX	13,000	XOM	11,000
Cash	10,000	Equity	12,000
Total	23,000	Total	23,000

The return is 20% (12,000/10,000).

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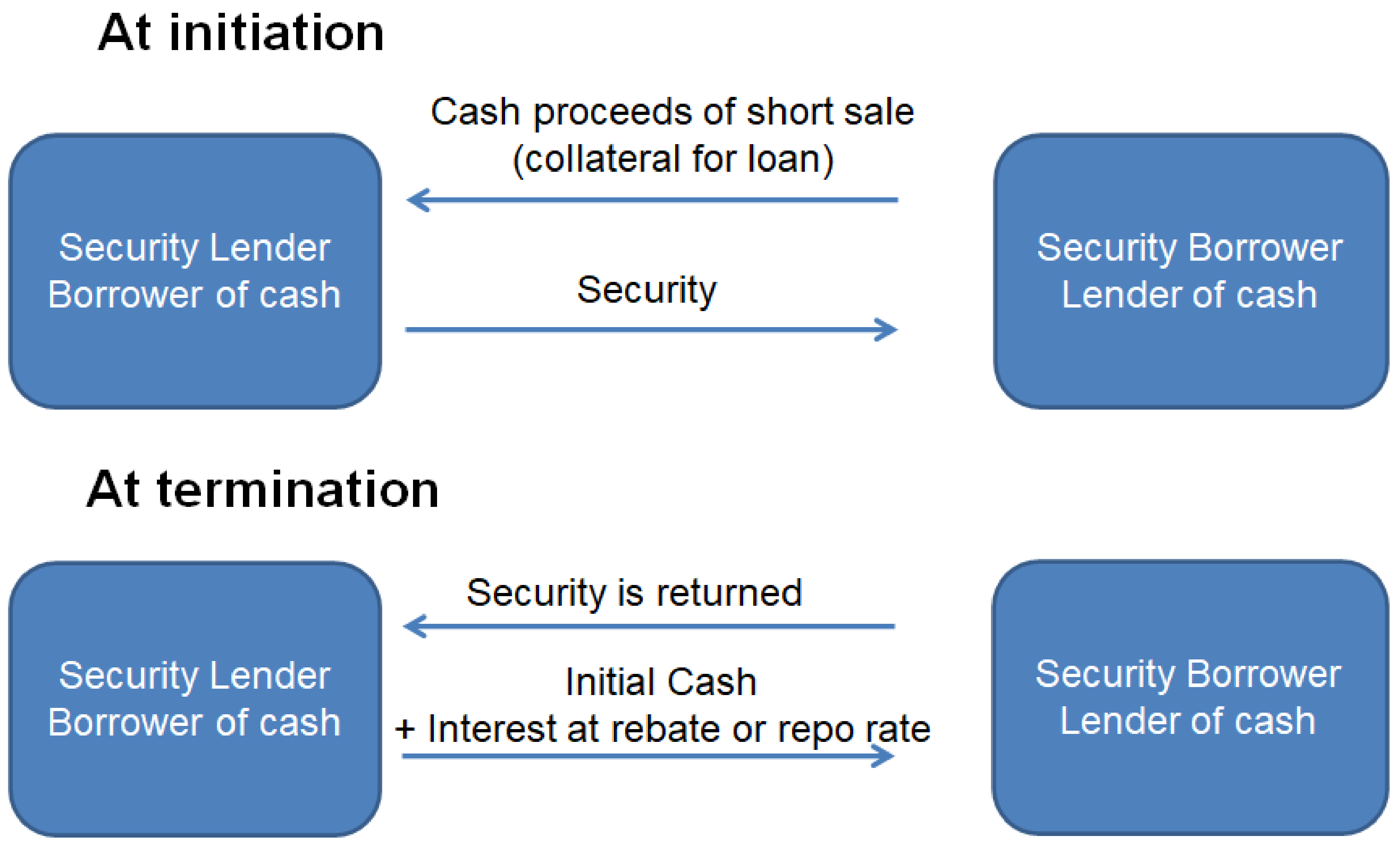
Margin Requirements

- Suppose you have a $100,000 portfolio and you want to add long-short bets like the CVX-XOM example.
- You can add $50,000 long and $50,000 short.
- Fed Reg T: sum of long and short positions cannot exceed twice your equity, when the positions are put on.
- Reg T is for initial margin. Maintenance margin is up to your broker.
- This is a 150/50 portfolio (150% long and 50% short).

Equity Lending

Equity lending



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Security lending vs. cash lending

Two ways to view the transaction

1. The short seller is borrowing equity and putting up cash collateral for the loan to protect the security lender.
2. The security lender is borrowing cash and putting up a security as collateral.

Rebate rates

- The security lender pays the security borrower interest on the cash collateral at a rate known as the **rebate rate**.

$$\text{rebate rate} = \text{short-term rate} - \text{asset-specific fee}$$

- Stocks with high fees are called **special**.
  - Fairly rare (<10%).
  - Unusual, but possible to have negative rebate rates

Recall risk

- Equity lending programs are handled by brokerages
- If the original owner wants to sell their shares, the brokerage must **recall** the stock loan.
- Alternatively, firms and investors may “engineer” recall through technical means
  - for instance, require physical stock certificate to receive dividends
- In the event of recall, the short-seller must either cover their short position or locate a new security loan.

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Dividends and interest

- You have to pay the lender dividends paid by the stock.
- As discussed above, cash proceeds from a short sale are held as collateral.
- How much interest you get on the cash collateral depends on your broker. Shop around.

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Information

Short-selling and Information

- Short-selling is robustly negatively related to future returns.
- This suggests shorts, on average, are informed traders.

Quantifying short-selling activity

- **Short interest**: number of shares held short at a point in time
- **Relative short interest**:

$$\text{RSI} = \frac{\text{short interest}}{\text{shares outstanding}}$$

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Limits to arbitrage

Arbitrage…and its limits

- Recall that an **arbitrage** is a trade that generates positive profits in some state of the world and generates losses in **no** state of the world.
- The mechanism by which there is an absence of arbitrage (free money!) in financial markets is traders monitoring and correcting price discrepancies.
- Importantly, we need to account for **all** frictions and costs in implementing arbitrage trades.

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Carve-outs and spin-offs

- **Equity carve-out**: IPO of a parent's holdings of a subsidiary
  - usually involves less than 20% of sub's shares (due to tax issues)
- **Spin-off**: pro-rata distribution of new shares in subsidiary to parent's shareholders
  - subsidiary becomes new, separate corporate entity
  - no cash raised (unlike equity carve-out)

A famous example: Palm-3Com Carve-out

- Palm (maker of Palm Pilots) was owned by 3Com (network systems & services)
- March 2, 2000: 3Com sells 5% of its stake in Palm to the general public in an IPO for Palm (an equity carve-out)
- 3Com announces it will spin off its remaining shares of Palm to 3Com shareholders before the end of the year
- 3Com shareholders would receive 1.5 shares of Palm for each share of 3Com they own.

Palm-3Com Carve-out

The carve-out creates two ways to buy Palm stock:

1. Buy 150 shares of Palm in the market
2. Buy 100 shares of 3Com, wait for spin-off, then receive 150 shares of Palm + ownership stake in 3Com's other assets

- Limited liability ($P_{3\text{Com}} \geq 0$) + Law of One Price:

$$P_{3\text{Com}} \geq 1.5 \cdot P_{\text{Palm}}.$$

(Mis-)Pricing around Palm IPO

- The day before the Palm IPO, 3Com closes at $104.13 per share.
- On the first day of trading, Palm closes at $95.06/share.
- If Palm is at $95.06, then 3Com should be at least
  - $1.5 \cdot 95.06 = \$142.59$
- Instead, the price of 3Com dropped to $81.81 (?!?)
  - What is the implied value of 3Com's non-Palm assets and businesses (so-called **stub value**)?
  - **-$61/share**

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Arbitrage trade

- How would one profit from this obvious & very large mispricing?
- Buy cheap, short dear
  - Buy 1 share of 3Com + short 1.5 shares of Palm

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In theory:

- Buy one share of 3Com: CF = -81.81
- Short 1.5 shares of Palm: CF = +1.5 · 95.06 = +142.59
- Net CF = +60.78 per share; AND, *little* risk in the future
  - you can cover your Palm short position with spin-off shares from the 3Com holdings.
- What happens as people buy 3Com and short Palm?
  - 3Com price should rise, Palm price should fall.

Palm-3Com "Stub" Value

This mispricing persisted for more than SIX WEEKS.

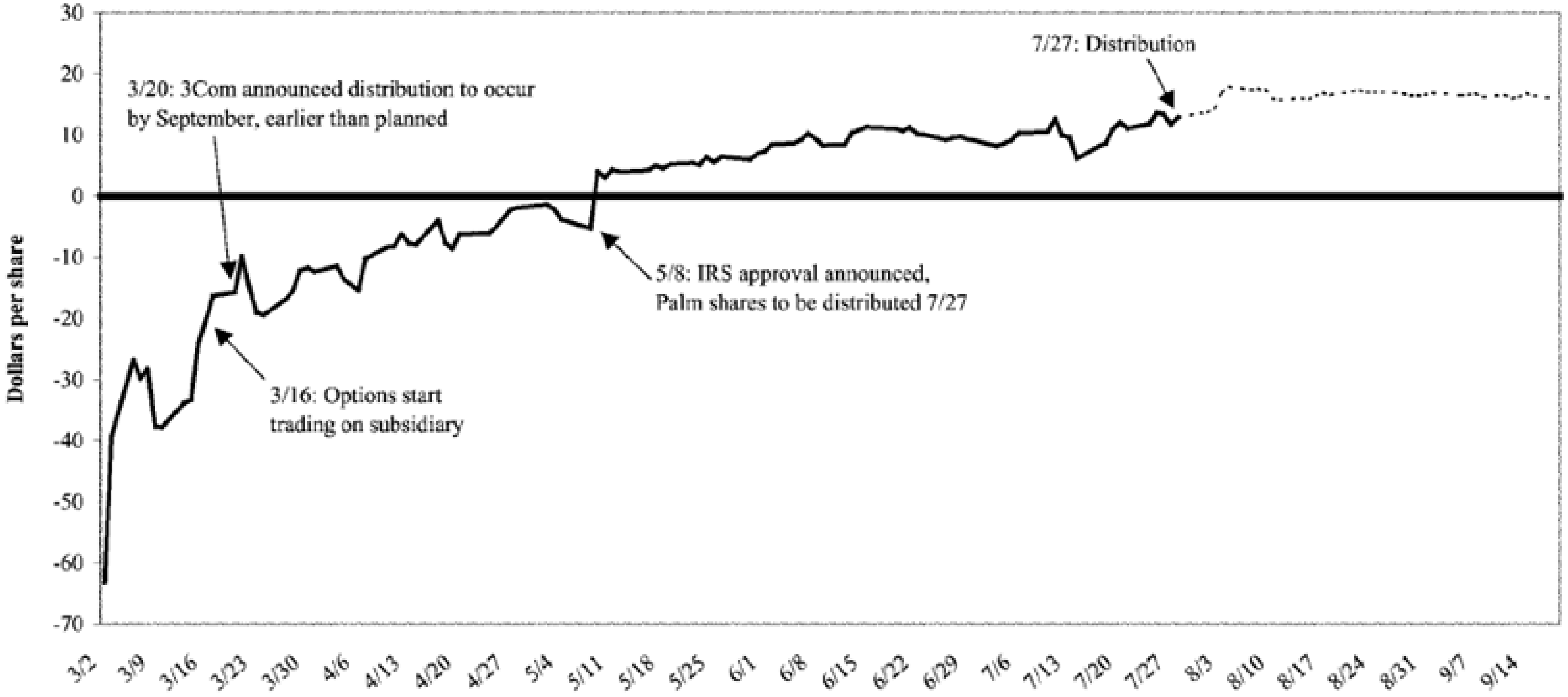

FIG. 3.—3Com/Palm stub, March 2, 2000–September 18, 2000

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Persistence of negative stubs

- Why did the glaring, obvious, and LARGE mispricing of Palm relative to 3Com persist?
  - That is, why didn't arbitrageurs eliminate it?
- It was nearly impossible to short Palm!
  - majority (95%) of the shares still held by 3Com, who was not willing to lend the shares to short sellers.
  - over time, this constraint became less binding, and prices began to converge to no-arbitrage levels.
- Short interest for Palm went from 19.4% (!) in the first month to 44.9% (!!) in the second month to 147.6% (!!!) at the peak.

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Lending fees for Palm

Selected negative rebate stocks (April 2000 through September 2001).[a]

Ticker	Company	Fee (%)	Month
CNH	CNH GLOBAL	79.0	200105
GM	GENERAL MTRS CORP	63.0	200005
TOT	TOTAL FINA SA[d]	55.0	200006
KREM	KRISPY KREME DOUGHNUTS INC[b]	55.0	200102
STLW	STRATOS LIGHTWAVE INC[b]	50.0	200009
UN	UNILEVER N V	46.0	200105
PRKR	PARKERVISION INC	45.0	200005
MCDT	MCDATA CORPORATION[b]	40.0	200106
RD	ROYAL DUTCH PETE CO[d]	35.0	200108
PPD	PRE PAID LEGAL SVCS INC	35.0	200109
PLMD	POLYMEDICA CORP	35.0	200109
PLCE	CHILDRENS PL RETAIL STORES INC	35.0	200105
PALM	PALM INC[b]	35.0	200008
ABX	BARRICK GOLD CORP	27.0	200005
BCE	BCE INC	26.5	200006
NOK	NOKIA CORP.[d]	25.0	200103

Limits to arbitrage

- Even with this fairly clean example, there was risk here.
- It was challenging and costly to borrow shares to short.
- The shorted shares could have been recalled.
- Prices could have moved against convergence, requiring additional capital
- IRS may not approve transaction

Regulation

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Short-sellers are unpopular

- GameStop episode
- Campaigns for short squeezes
- Requirements for physical ownership of share certificates for distributions
- Regulation

Short-selling regulation

- Short sellers make money when prices fall.
  - Prices may fall *because* of short selling
  - or prices may fall *coincident* with short selling
  - correlation $\neq$ causation!
- Short sellers do seem to be informed, on average.
- Because short-selling is perceived to have detrimental effects on market quality, it is a frequent subject of regulation.

Prohibiting short-sales

- Some jurisdictions simply do not allow short-selling for all or some securities
- US banned short-sales in 2008 for financial stocks
- Hong Kong requires security be above market cap and volume thresholds

Restricting short-sales

- Restrictions are designed to reduce the possibility that short-sellers will *cause* price declines
- Prices tests like requiring last trade to be above the last transaction price
- US Rule 201: uptick rule for rest of day and next day for stocks experiencing intraday price declines of 10%

Regulatory response to crises

- During the 2008 financial crisis, the SEC temporarily banned short-selling in financial firms.
- A number of European countries have turned restrictions or prohibitions on or off in response to crises.
- Because this regulation is not randomly assigned to stocks or countries, it is hard to understand whether short-selling **causes** price drops or increased volatility

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For next time: Diversification