Financial Markets and Instruments (Lecture 2)

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Other derivatives

- Swaps.
- Warrants.
- Obrigações convertíveis.

Vital importance of the underlying asset.

Over the counter markets

- A product with some characteristics (but not all) of futures and traded on over the counter markets (hence outside the exchange) is called a forward.

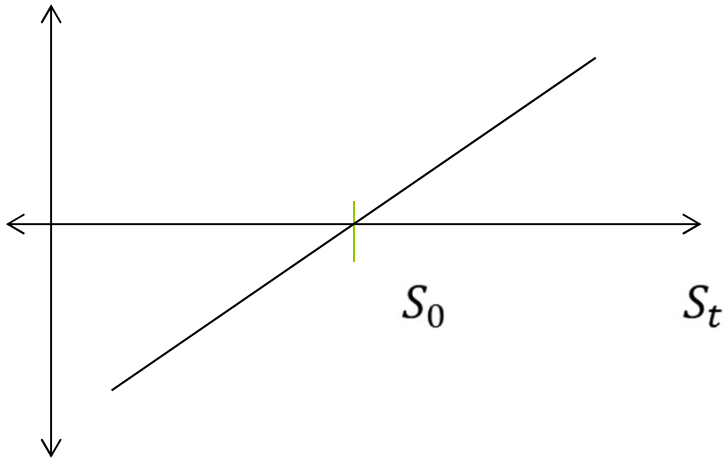
- Examples of porfolios with options:

- Payoff the comprar uma acção:

- $P = S_t - S_0$

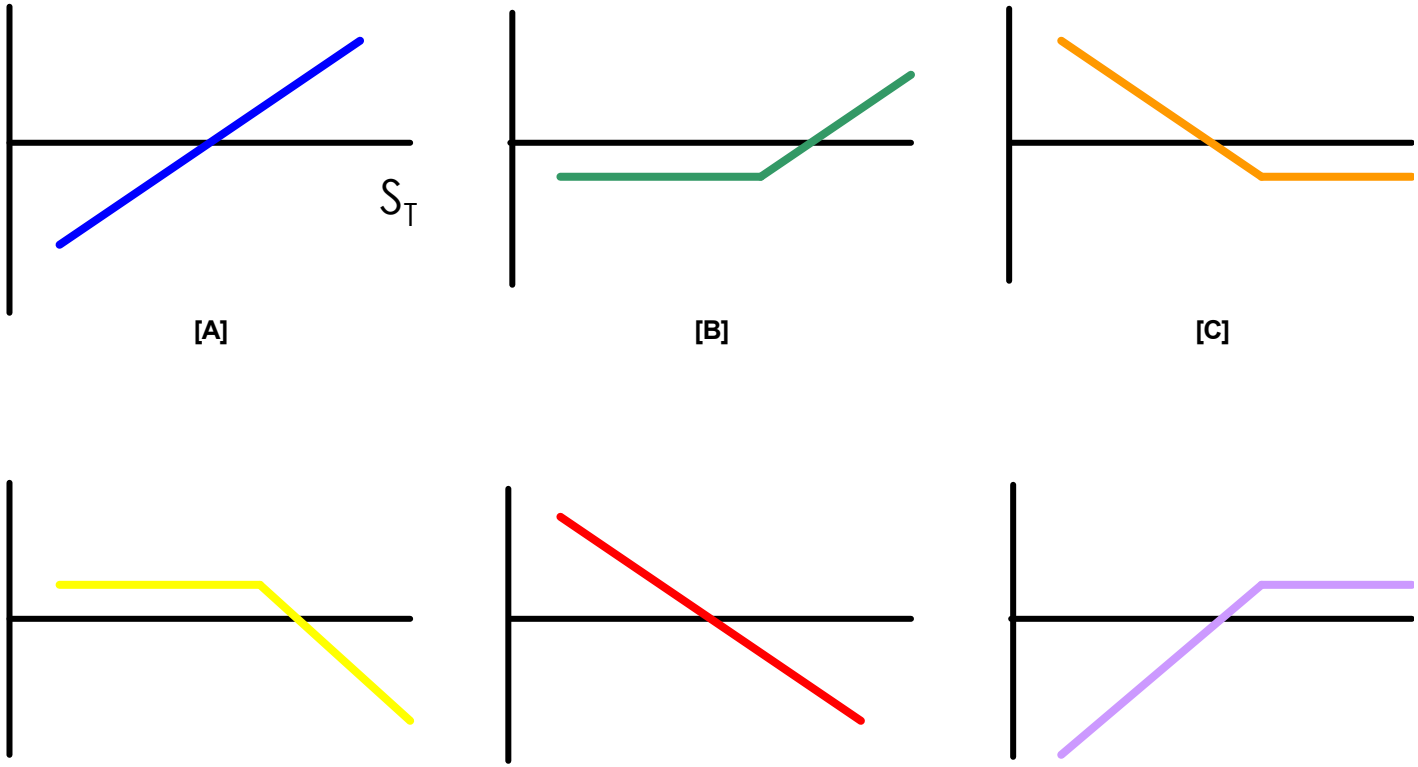
- Payoff the comprar uma acção:

- $P = S_t - S_0$



Seis formas básicas de payoffs

Profit

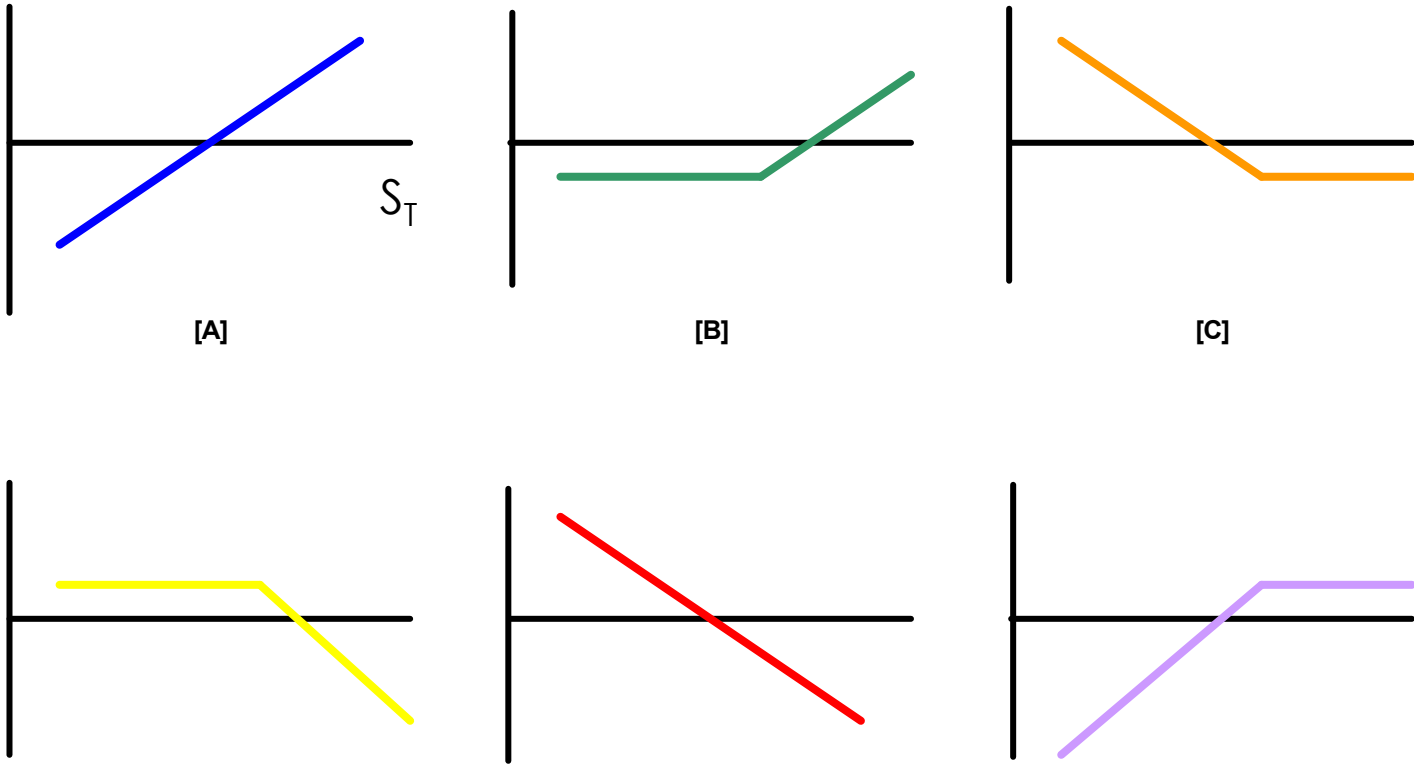


- Payoff de vender uma acção a descoberto:

- $P = S_0 - S_t$

Seis formas básicas de payoffs

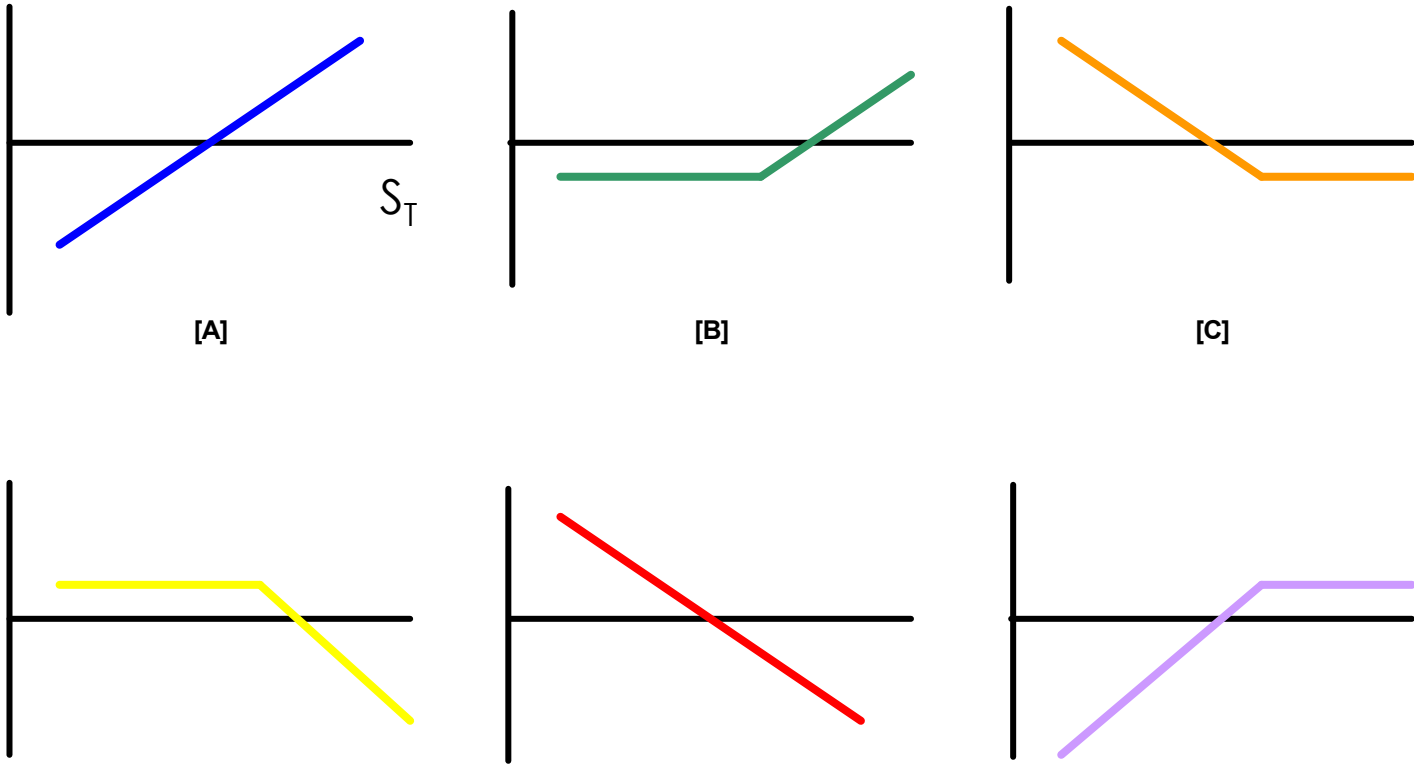
Profit



- Payoff de comprar uma opção de compra.
- $P = Max(S_t - S_E - p; -p)$
- Payoff de vender uma opção compra
- $P = Min(-S_t + S_E + p; p)$

Seis formas básicas de payoffs

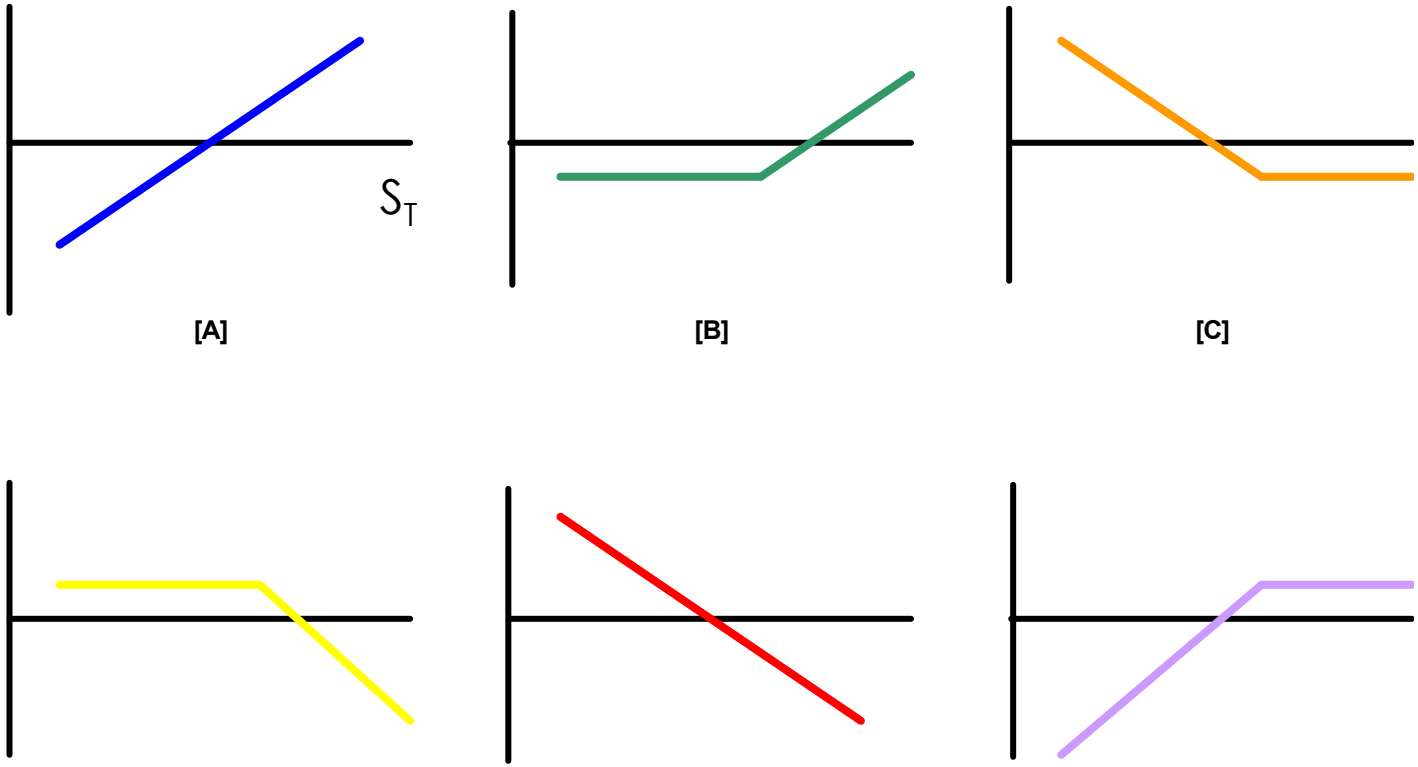
Profit



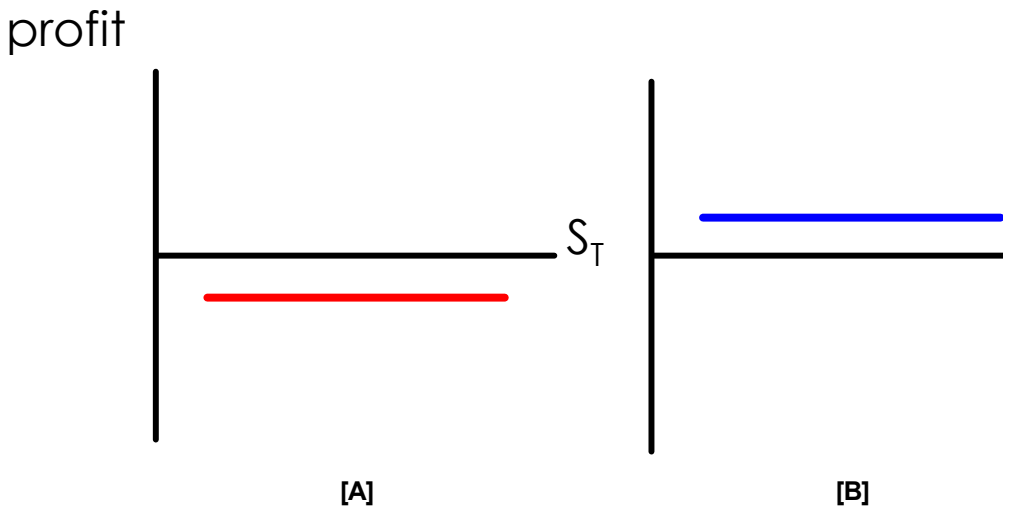
- Payoff de comprar uma opção de venda.
- $P = Max(S_E - S_t - p; -p)$
- Payoff the vender uma opção venda
- $P = Min(-S_E + S_t + p; p)$

Seis formas básicas de payoffs

Profit



Para além disso existem ainda duas posições chamadas sem risco por terem payoffs não dependentes do valor de St.

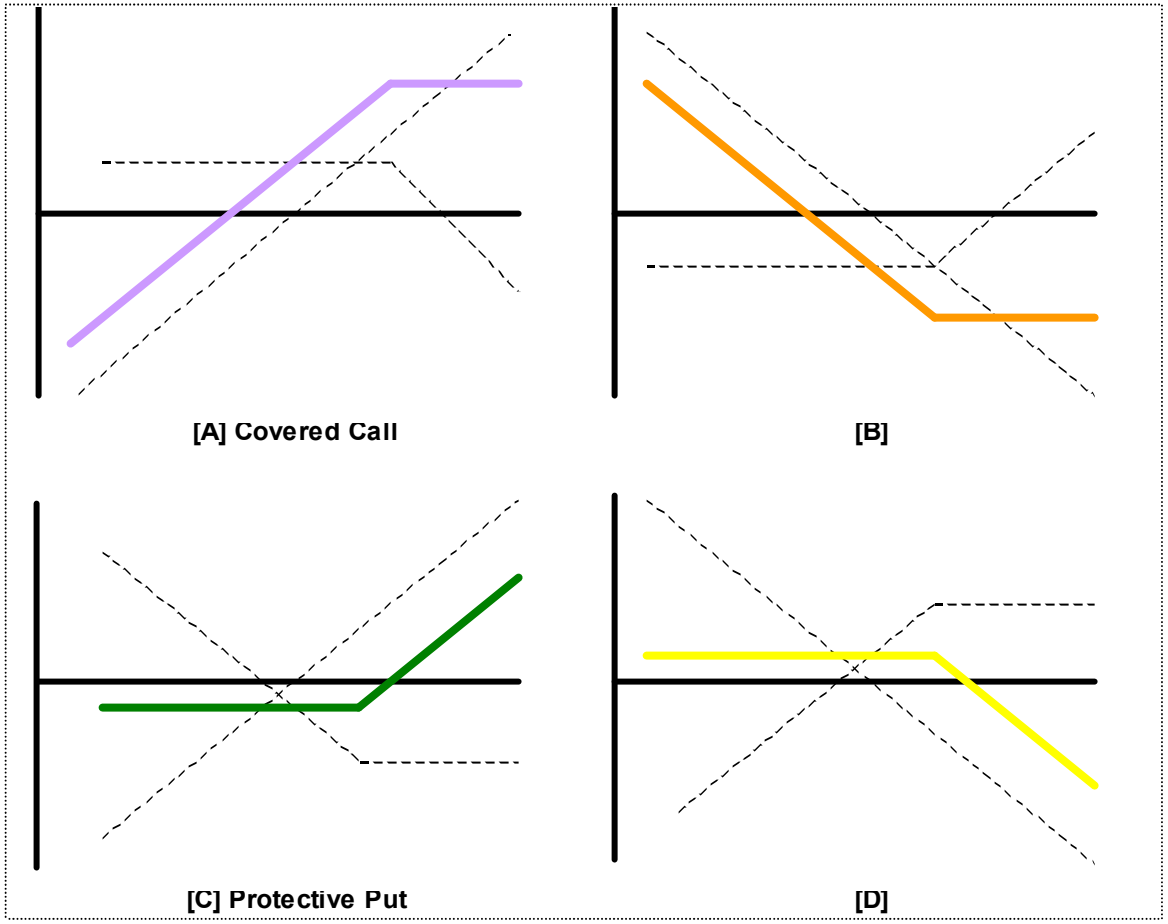


- As estratégias com opções vão fazer combinações com estes payoffs.

Basicamente, existem três grandes estratégias com opções:

- i) Assumir posições num tipo de opções e no ativo subjacente.
- ii) Assumir posições em opções do mesmo tipo, ou seja, só de compra ou só de venda (Spread strategy).
- iii) Assumir posiçõs em opções de tipo diferente, isto é de compra e venda (Combination strategy).

- i) Assumir posições num tipo de opções e no ativo subjacente.


[A] Covered Call
[B]
[C] Protective Put
[D]

- Suppose you current own 100 shares of a stock, with a value of $86.38/share.
- You fear it may fall in value in the short run, but do not want to sell now.
- You see the following option data:

Strike	Call	Put
75	11.50	0.75
80	7.00	1.38
85	4.25	3.25
90	2.25	6.13
95	0.81	8.88

- You decide to purchase an 85 put.
- The protective put strategy is long stock + long put.

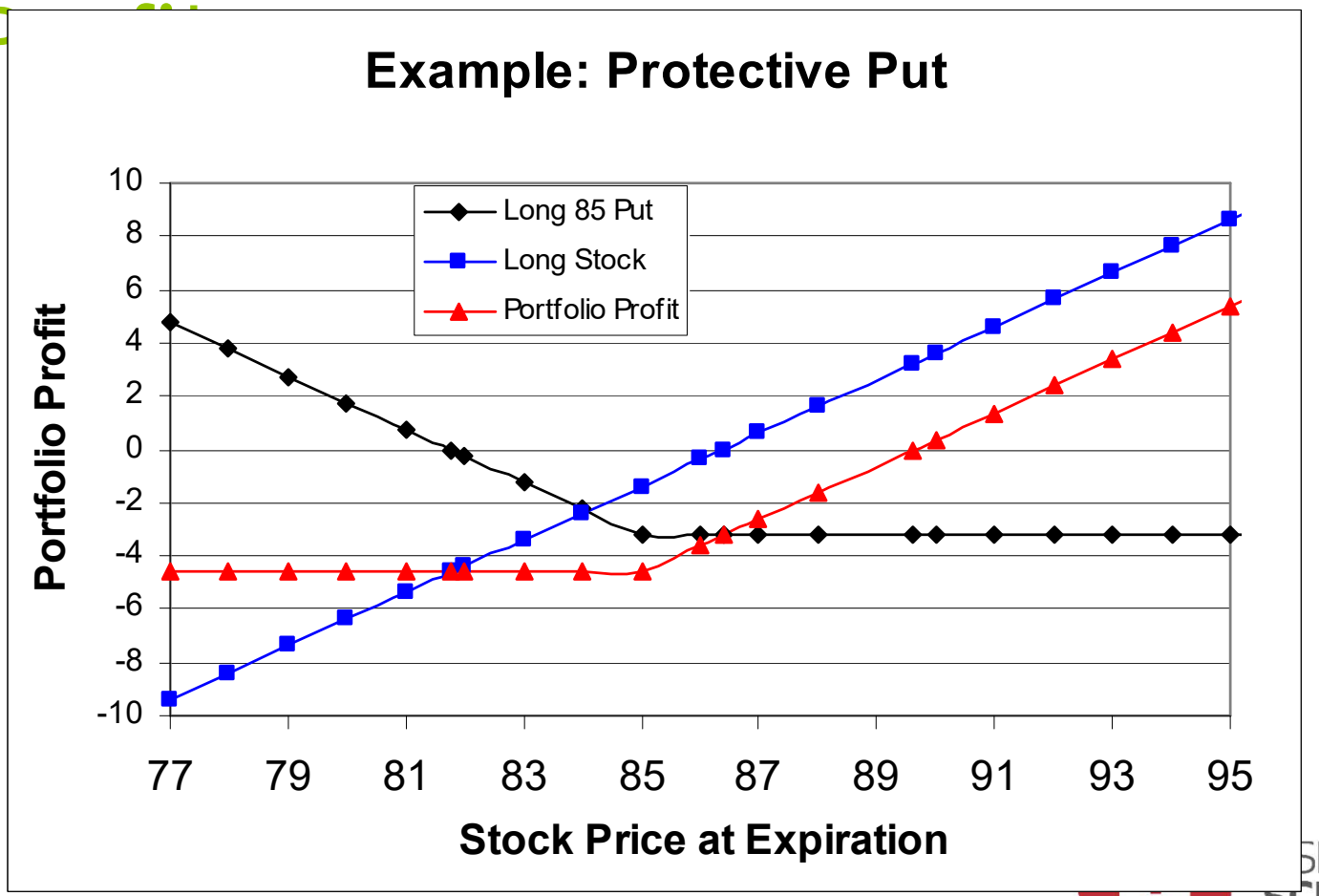
Example: Protective Put, II

- That is:

At time 0	
Buy stock	-86.38
Buy put	- 3.25
CF(0)	-89.63

Stock Price at Expiration	P(T) 85 Put	Sell stock	CF(T)	CF(0)	CF(0)+CF(T) Portfolio Profit
78.00	7.00	78.00	85.00	-89.63	(4.63)
79.00	6.00	79.00	85.00	-89.63	(4.63)
80.00	5.00	80.00	85.00	-89.63	(4.63)
81.00	4.00	81.00	85.00	-89.63	(4.63)
81.75	3.25	81.75	85.00	-89.63	(4.63)
82.00	3.00	82.00	85.00	-89.63	(4.63)
83.00	2.00	83.00	85.00	-89.63	(4.63)
84.00	1.00	84.00	85.00	-89.63	(4.63)
85.00	0.00	85.00	85.00	-89.63	(4.63)
86.00	0.00	86.00	86.00	-89.63	(3.63)
86.38	0.00	86.38	86.38	-89.63	(3.25)
87.00	0.00	87.00	87.00	-89.63	(2.63)
88.00	0.00	88.00	88.00	-89.63	(1.63)
89.25	0.00	89.25	89.25	-89.63	(0.38)
89.63	0.00	89.63	89.63	-89.63	0.00
90.00	0.00	90.00	90.00	-89.63	0.37
91.00	0.00	91.00	91.00	-89.63	1.37
92.00	0.00	92.00	92.00	-89.63	2.37

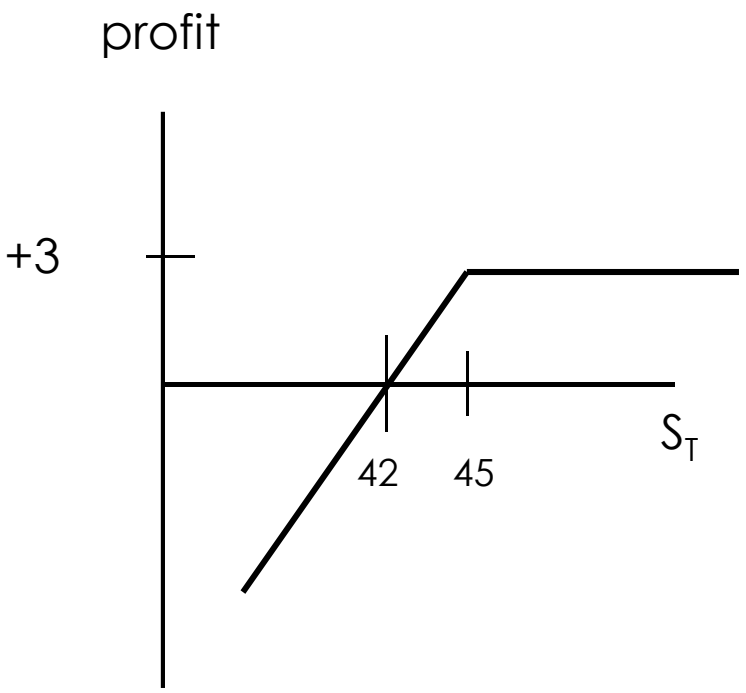
This is the range of S(T) that you really need


Example: Protective Put
Long 85 Put
Long Stock
Portfolio Profit
Portfolio Profit
10
8
6
4
2
0
-2
-4
-6
-8
-10
77
79
81
83
85
87
89
91
93
95
Stock Price at Expiration

Writing a covered call

- Buy a stock for S(0) = 43
- Sell a call with K = 45 for C(0) = 1
- Initial outlay is -42

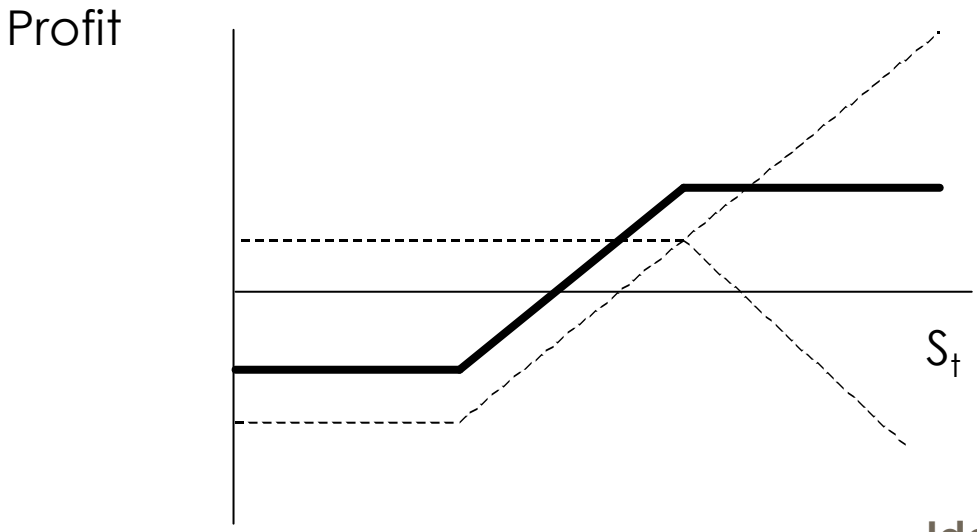
Stock Price at Expiration	offset C(T) 45 call	Sell stock	CF(T)	CF(0)	CF(0)+CF(T) Portfolio Profit
40.00	0.00	40.00	40.00	-42.00	(2.00)
41.00	0.00	41.00	41.00	-42.00	(1.00)
42.00	0.00	42.00	42.00	-42.00	0.00
43.00	0.00	43.00	43.00	-42.00	1.00
44.00	0.00	44.00	44.00	-42.00	2.00
45.00	0.00	45.00	45.00	-42.00	3.00
46.00	-1.00	46.00	45.00	-42.00	3.00
47.00	-2.00	47.00	45.00	-42.00	3.00
48.00	-3.00	48.00	45.00	-42.00	3.00



- ii) Assumir posições em opções do mesmo tipo, ou seja, só de compra ou só de venda (Spread strategy).

Vertical Spreads I,

- **[A] Bulish Vertical Spread with Calls (AKA: A Bull Call Spread, or Buy Call with lower strike.**
  - **Sell Call with higher strike.**



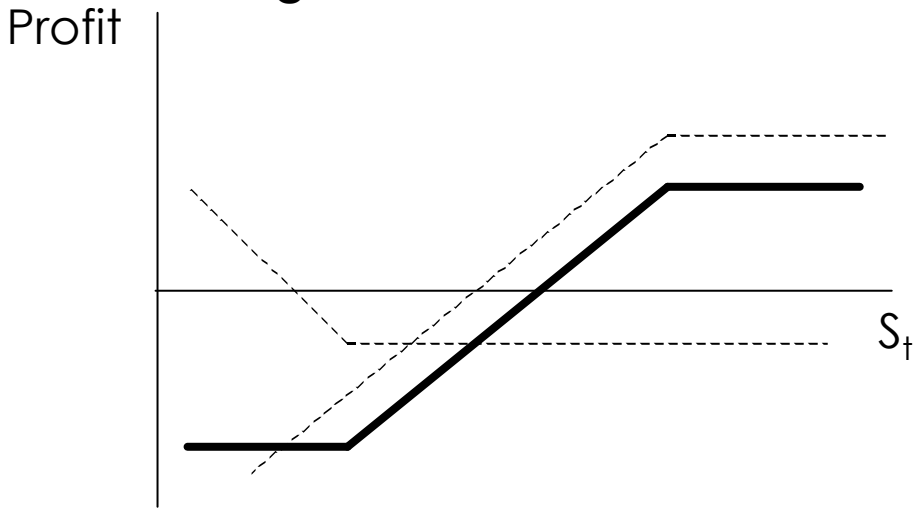
[A] Bull Call Spread

Note that there is an initial outlay with this strategy; the purchased call has a higher price than the written call

Identify the Strike Prices Using the 'kinks'

Vertical Spreads, II.

- **[B] Bullish Vertical Spread with Puts (AKA: A Bull Put Spread.)**
  - **Buy Put with lower strike.**
  - **Sell Put with higher strike.**



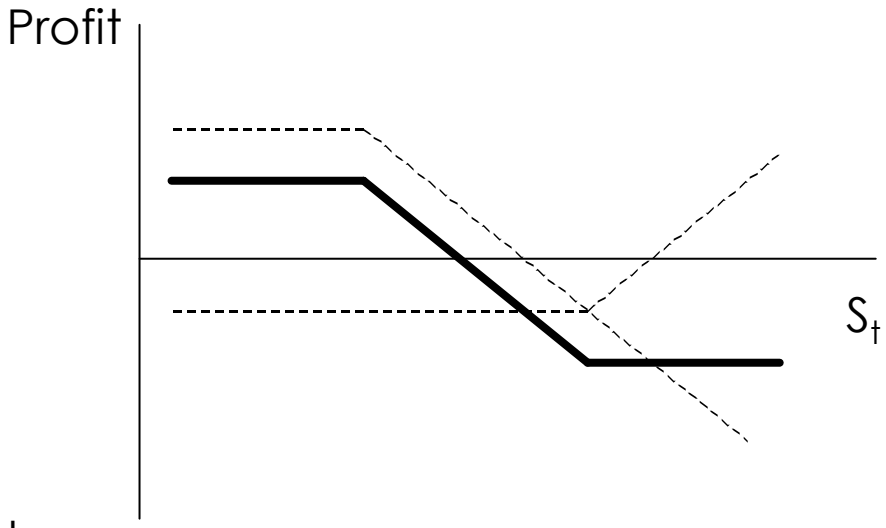
[B] Bull Put Spread

There is an initial cash inflow with this strategy.

Again: Identify the Strikes by the 'Kinks'. Do they make sense?

Vertical Spreads, III.

- **[C] Bearish Vertical Spread with Calls (AKA: A Bear Call Spread.)**
  - **Buy call with higher strike.**
  - **Sell call with lower strike.**



Is there an initial cash inflow or outflow?

[C] Bear Call Spread

Example: Bullish Vertical Spread with Calls, I.

- Suppose you observe the following data from the CBOE:
  - Price of Jan 80 Call: \$3.75 (\$375 per contract)
  - Price of Jan 75 Call: \$5.00 (\$500 per contract)
- You decide to buy the Jan 75 call and sell the Jan 80 Call.
- Today, your outlay is \$1.25, or \$125 per contract.
- At expiration:
  - At any price lower than \$75, your payoff is \$0 and your loss is \$1.25 (your initial outlay).
  - If the underlying price is \$76 at expiration, your payoff is \$1.00, and your loss ($CF_0 + CF_T$) is \$0.25.
  - If the underlying price is \$77 at expiration, your payoff is \$2.00, and your profit is \$0.75.
  - If the underlying price is \$79 at expiration, your payoff is \$4.00, and your profit is \$2.75.
  - At any price equal to or above \$80, your payoff is \$5.00, or \$500, and your profit is 3.75.

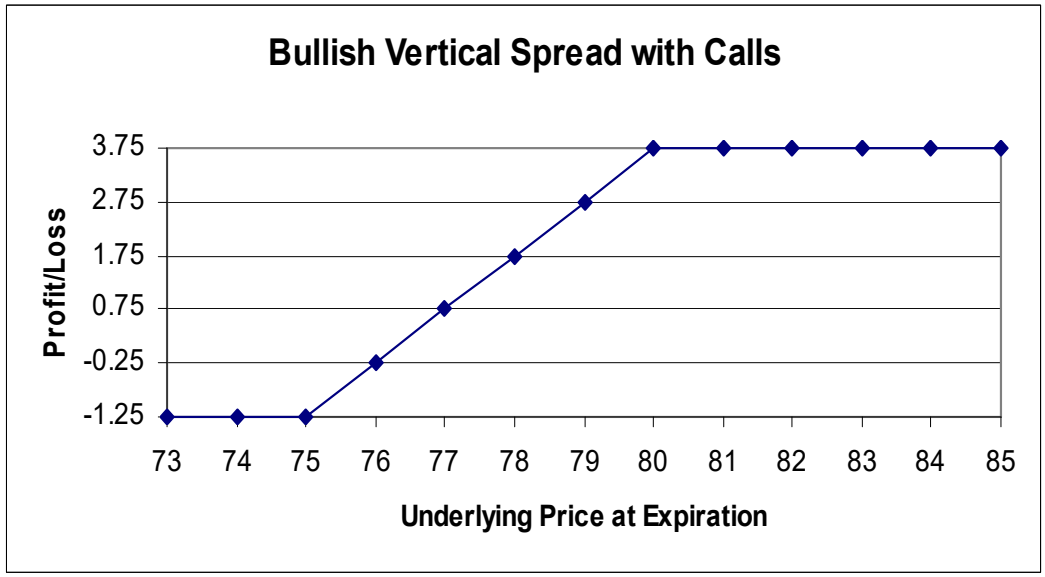
Example: Bullish Vertical Spread with Calls, II.

- Today: Buy Jan 75 call -5
  Sell Jan 80 call +3.75
  CF(0) -1.25

S_T	C(T) Offset 75 Call	C(T) offset 80 Call	CF(T)	Total Profit CF(0)+CF(T)
73	0.00	0.00	0.00	(1.25)
74	0.00	0.00	0.00	(1.25)
75	0.00	0.00	0.00	(1.25)
76	1.00	0.00	1.00	(0.25)
77	2.00	0.00	2.00	0.75
78	3.00	0.00	3.00	1.75
79	4.00	0.00	4.00	2.75
80	5.00	0.00	5.00	3.75
81	6.00	(1.00)	5.00	3.75
82	7.00	(2.00)	5.00	3.75
83	8.00	(3.00)	5.00	3.75
84	9.00	(4.00)	5.00	3.75
85	10.00	(5.00)	5.00	3.75

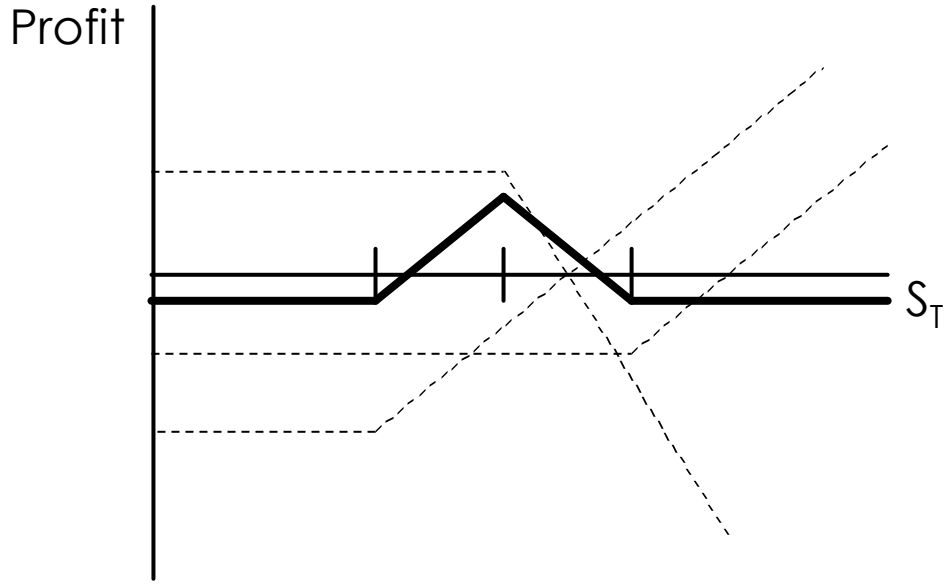
Example: Bullish Vertical Spread with Calls, III.

Then, one can plot the underlying price at expiration against the position profit or loss (note that the kinks are at the strike prices, 75 and 80): **(Obviously, one could plot each elementary position as well.)**



Butterfly Spread Using Calls

- **This is a Long Call Butterfly: With equally spaced strikes:**

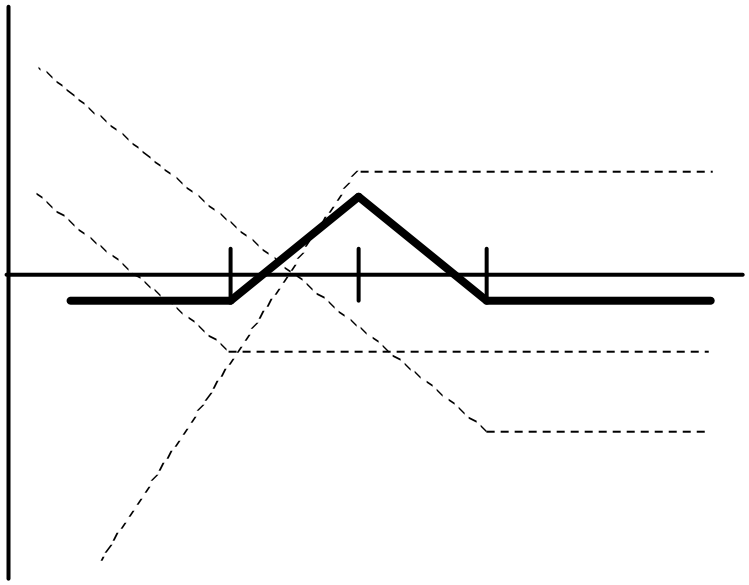


Long Butterfly Using Calls

Long 1 with lowest strike;
Short 2 with middle strike;
Long 1 with highest strike

Butterfly Spread Using Puts

- **This is a Long Put Butterfly: With equally spaced strikes:**



Long 1 with lowest strike;
Short 2 with middle strike;
Long 1 with highest strike

Long Butterfly Using Puts

What do you think a written butterfly would look like?

Other Spreads, I.

- Calendar Spreads:
  - Use the same strike, but with two different expiration dates.
  - Can use either calls or puts.
  - The resulting payoff is curved. This is because one option is still 'alive' at the expiration date of the other.

- Ratio Spreads
- Can use either calls or puts.
  - Same expiration, but with two different strikes.
  - **However,** unlike other spreads, the number of options held in each position is not the same. For example, a one could buy 3 puts with a strike of 30, and sell one put with a strike of 35.

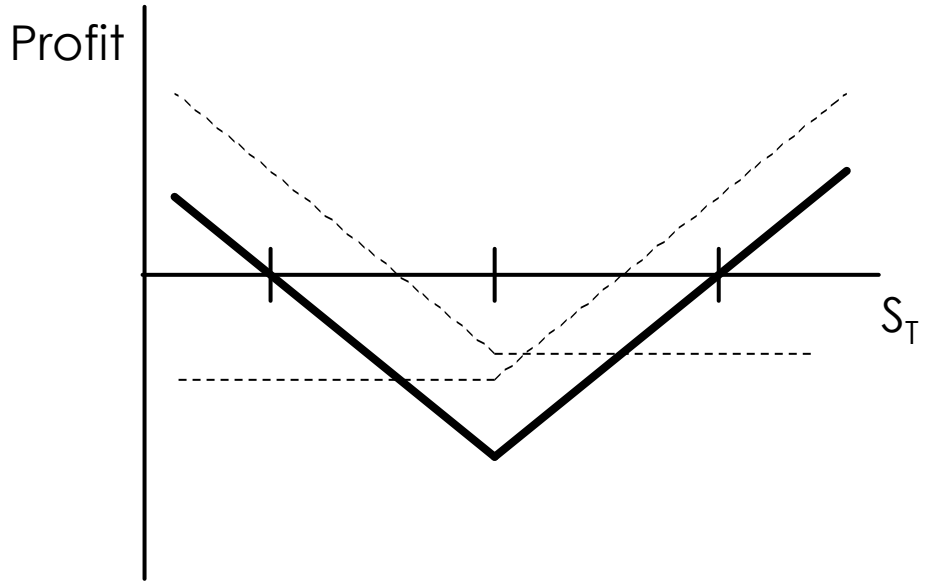
Other Spreads, II.

- Condor Spread.
  - Uses four, equally spaced strikes.
  - For a long condor spread: Long 1 at the lowest and 1 at the highest strike; short 1 at both intervening strikes.
  - The resulting payoff resembles a butterfly spread, but with a 'flat spot' between the middle two strikes. (The payoff for a long butterfly resembles a 'witches' hat; the payoff for a long condor resembles a 'stovepipe' hat.)

- iii) Assumir posiçõs em opções de tipo diferente, isto é de compra e venda (Combination strategy).

Combinations, I.

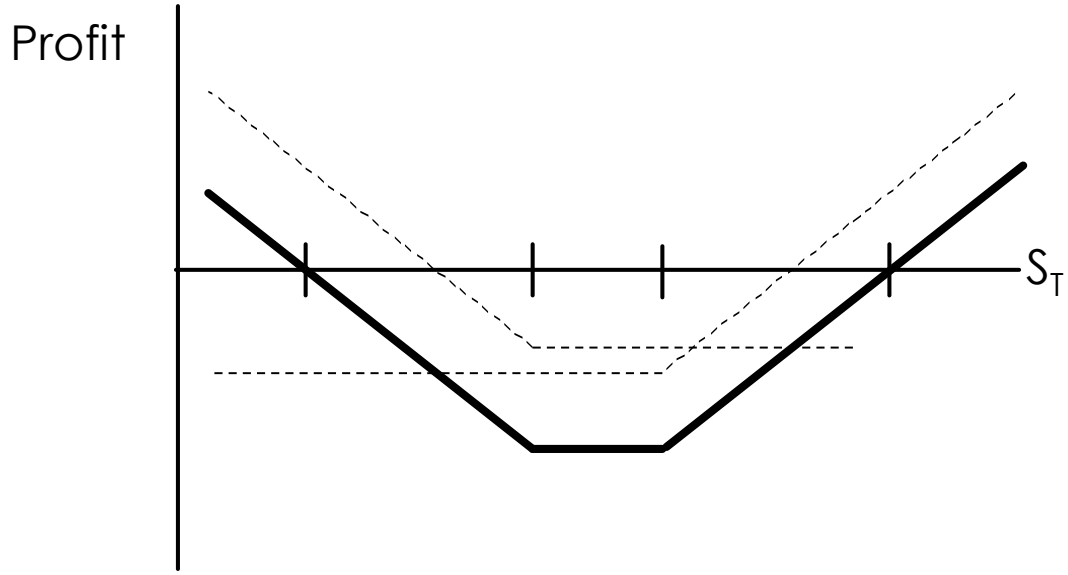
- A Long **Straddle** is formed by a long call and a long put:
  - Both have the same strike and expiration date.
  - What is the **worst** possible value for the underlying at expiration?
  - In a Short Straddle, one sells the call and sells the put.



Long Straddle Using a Call and a Put

Combinations, II.

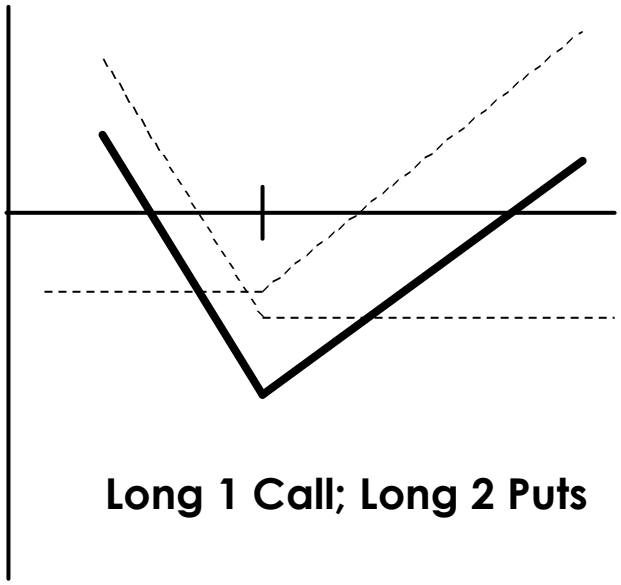
- A Long **Strangle** is formed by a long call and a long put:
  - Both have the same expiration date.
  - But, the call and put have different strike prices.
  - In a Short Strangle, one sells the call and sells the put. (what does it look like?)



Long Strangle Using a Call and a Put

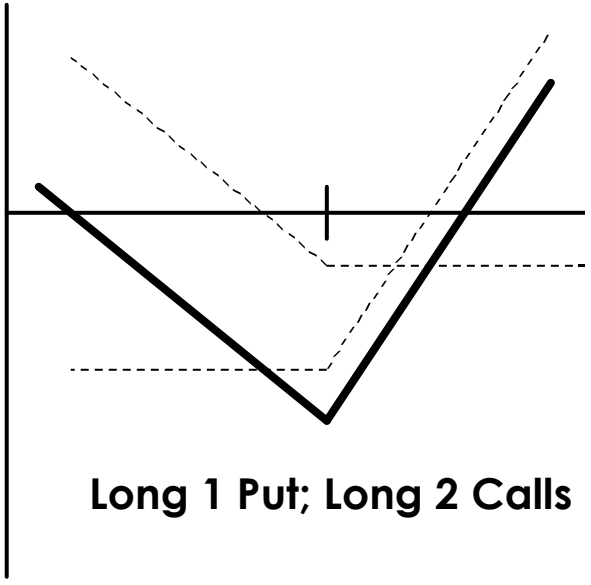
Combinations, III. Strips and Straps

- Strips and straps are formed by using a different number of calls and puts. However, all the options share
  - The same strike price.
  - The same expiration date.



Long 1 Call; Long 2 Puts

[A] Long Strip



Long 1 Put; Long 2 Calls

[B] Long Strap

What are the slopes of these lines?

Example: Long 85 Straddle

- You see the following option data and decide to purchase an 85 call and an 85 put.

Strike	Call	Put
75	11.50	0.75
80	7.00	1.38
85	4.25	3.25
90	2.25	6.13
95	0.81	8.88

- Using the steps to build a profit table, you construct the following table.

Long 85 Straddle, II.

Time 0

Buy C (K=85) -4.25

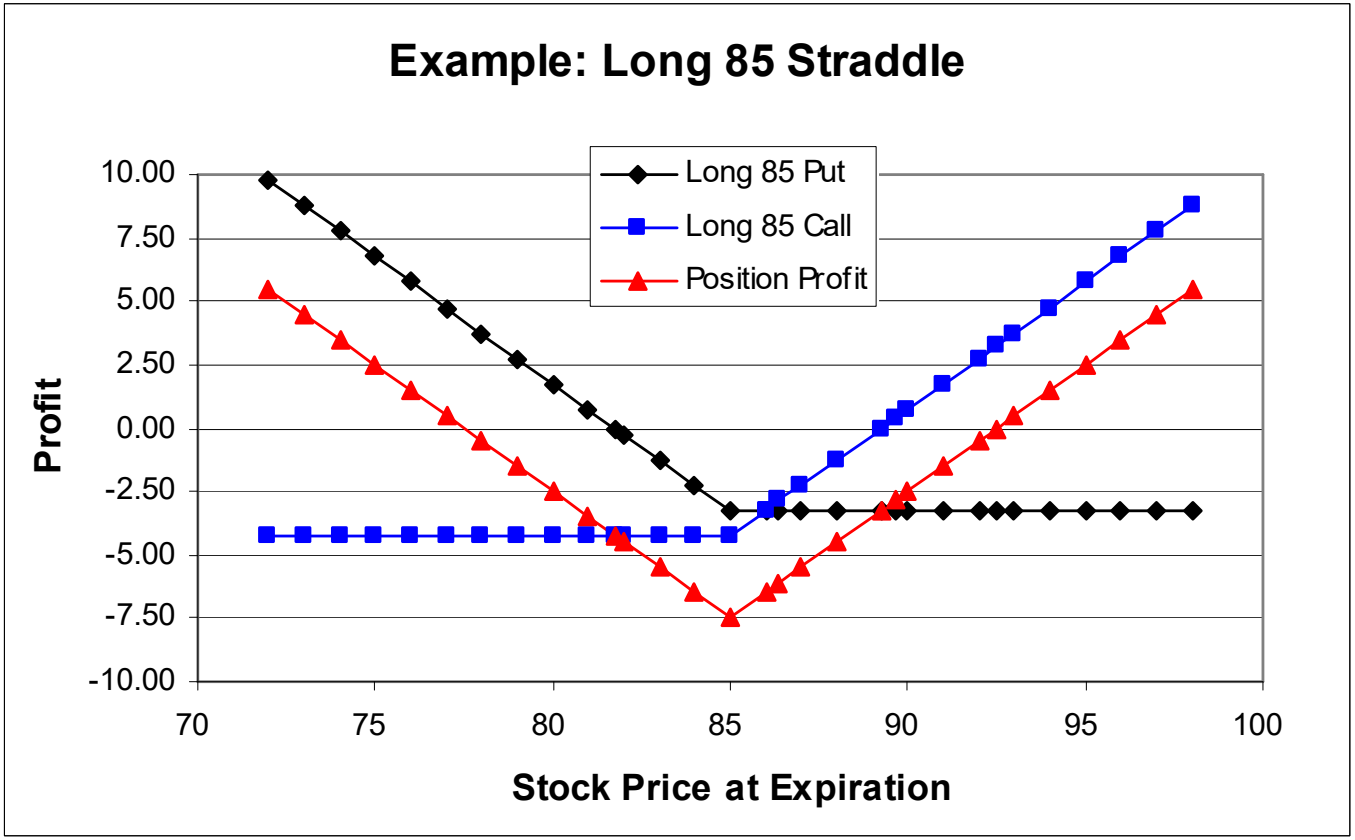
Buy P (K=85) -3.25

CF(0) -7.50

Stock Price at Expiration	Offset P(T) 85 Put	Offset C(T) 85 Call	CF(T)	CF(0)	Portfolio Profit
75.00	10.00	0.00	10.00	(7.50)	2.50
76.00	9.00	0.00	9.00	(7.50)	1.50
77.00	8.00	0.00	8.00	(7.50)	0.50
78.00	7.00	0.00	7.00	(7.50)	(0.50)
79.00	6.00	0.00	6.00	(7.50)	(1.50)
80.00	5.00	0.00	5.00	(7.50)	(2.50)
81.00	4.00	0.00	4.00	(7.50)	(3.50)
81.75	3.25	0.00	3.25	(7.50)	(4.25)
82.00	3.00	0.00	3.00	(7.50)	(4.50)
83.00	2.00	0.00	2.00	(7.50)	(5.50)
84.00	1.00	0.00	1.00	(7.50)	(6.50)
85.00	0.00	0.00	0.00	(7.50)	(7.50)
86.00	0.00	1.00	1.00	(7.50)	(6.50)
86.38	0.00	1.38	1.38	(7.50)	(6.12)
87.00	0.00	2.00	2.00	(7.50)	(5.50)
88.00	0.00	3.00	3.00	(7.50)	(4.50)
89.25	0.00	4.25	4.25	(7.50)	(3.25)
89.63	0.00	4.63	4.63	(7.50)	(2.87)
90.00	0.00	5.00	5.00	(7.50)	(2.50)
91.00	0.00	6.00	6.00	(7.50)	(1.50)
92.00	0.00	7.00	7.00	(7.50)	(0.50)
92.50	0.00	7.50	7.50	(7.50)	0.00
93.00	0.00	8.00	8.00	(7.50)	0.50
94.00	0.00	9.00	9.00	(7.50)	1.50
95.00	0.00	10.00	10.00	(7.50)	2.50

Long 85 Straddle, III.

Then, one can plot the profit data:



2. Financial markets: A historical perspective

- 2.1 Origins, tendencies and developments at medieval ages and renaissance.

- Michie (2006) situates the origin of contemporary financial markets at medievel cities of Venice, Genova and Florence.

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- 1171-2 – *Presttiti* securities.

- Properties of *Presttiti* securities.

Exc of Eng

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- 1378-1381 – Prestitti payment suspended. When returned, interest rates were lower.

- Italian cities have lost their mighty due to end of monopoly over trade routes with Asia.

- Finacial centers move to north of Europe.

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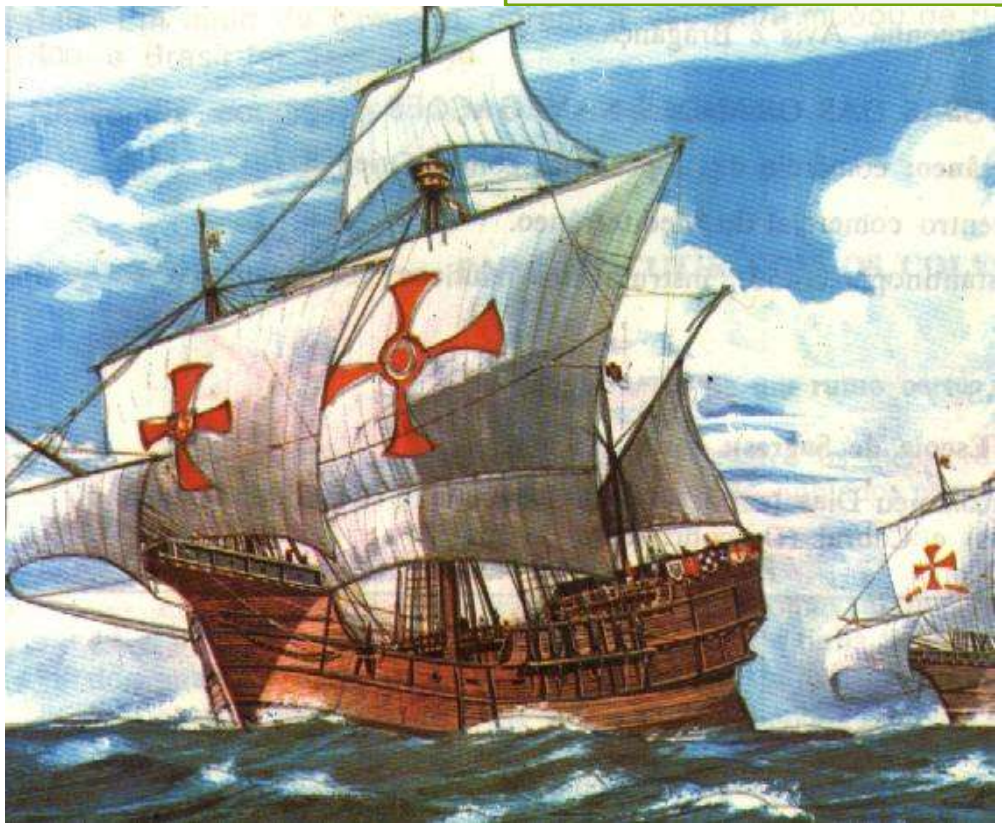
- First Bruges and Antwerp.
- Later Amesterdam would rise as the most important financial center in the world.
- Amesterdam bank and the Atlantic trade



- Amsterdam provide financing and also sold insurance for maritim expeditions.

- It also launched the basis for the modern shares based company with the Dutch India Company.


The Dutch East India Company

- 1602: around 1000 investors.
- 1700: around 45 000 investors
- Important features of the modern company

- Other financial centers gaining proeminence: Lisbon, Hamburg, and Vienna.

- London's capital market benefited very much when William of Orange ascended to power, as he had a great expertise and high level contacts with the Dutch financial market.

- He created the Bank of London, and sovereign bonds with 8% interest guaranteed, which attracted many investors.

- Sovereign risk very relevant at the time. Many important countries have defaulted on creditors as Spain (3 times between 1600-1650) and France (bankrrupt in 1648).

- John Law, created bank of france for the French king, and the first major speculative bubble based on shares. South Mississipi company, with promissed assured dividend of 12%.

- Great collapses led to concerns about problem of speculations.

- Governments were very important both in developing the financial markets as to cause major crisis.

- 2.2 Advances and setbacks in the formation of investment markets [1720-1815]

- At the beggining of XVIII century several stock exchanges exist
- Governments aware of the importance of trust and committments.
- Speculative bubbles

- In this period Amsterdam lost its dominant status

- France: Paris Stock Exchange and Coulisse
- Attempt to put public finances in order
- Bubbles and later colapse
- French Revoluiton

- London

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- French Revolution as the key event that has made Amsterdam to lose its dominant status.

- 1) France and other countries stop paying debts

- 2) French invasions make merchants and investors to escape and find refuge in London.

- Fatal strike to Amsterdam position as the World's financial centre
- London has gained not only new funds and business, but also a key technical expertise.
- Great influx of operators to London led it to be more restrictive and demanding. New markets are developed as Manchester, Glasgow, Edinburgh or Liverpool

- Note that USA that would later become the great financial center of the World was still in a development phase.

- USA and banks

Major Cities

- 2.3. Advances and setbacks in the formation of investment markets [1720-1815]

- Revolutions and wars (1789-1815) have deeply affected investment markets.
- Note that Amsterdam had been the key financial center for 200 years.
- After this period, however investment markets have gained again strenght.

- Amesterdam regained some position, but could no longer compete with London or Paris in terms of
- a) Organization
- b) Investors trust
- c) Atracting investment

- Paris becomes the great market for Sovereign debt (e.g. Portugal, Spain, Belgium, Netherlands).

- London, other british exchanges, and New York, also atract national debt, but develop key expertise in large corporation projects.

- Greater sophistication in the type of securities traded.

- Important social and economic phenomenon with great impact for capital markets:

- The industrial revolution.

- Investment markets contributing for economic development.

- Other particularly importante technological inovation for investment markets: Improvments in communications


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- Great development at the sophistication of securities associated with a great development in communication technologies.

- Development os finantial markets as a world phenomenon

- USA's development of capital markets was limited because of civil war.

- Important alteration in the pattern of financing of governments through financial markets.

- The focus was no longer only the militar effort or wars.

- Public financing of national projects (e.g. railways, shipyards, schools, hospitals, etc.)

Table 4.1. World railway mileage (km)

Year	Total	Europe	North America	South/Central America	Asia	Africa	Australia/ New Zealand
1850	38,152	23,026	14,624	502	—	—	—
1900	765,222	265,574	340,868	60,843	56,624	16,319	24,994

Source: B. R. Mitchell, *International Historical Statistics* (London, 1998), vol 1–3, table F1.

Table 4.2. Securities as a proportion of national assets, 1850–1900

Category	Belgium	France	Germany	India	Italy	UK	US	Average
1850/60								
Government Domestic Debt(%)	5.1	4.4	2.3	2.6	5.4	12.8	3.2	5.1
Corporate Bonds(%)	—	0.9	0.9	0.15	1.6	3.0	2.8	1.6
Corporate Stocks(%)	6.5	1.0	0.5	0.15	1.8	3.0	5.5	2.3
Foreign Assets (gross) (%)	—	1.7	—	—	—	—	0.5	
Foreign Assets (net)(%)	—	0.5	—	−2.2	−0.5	3.1	−2.1	1.7
Total(%)	11.6	7.8	3.7	0.7	8.3	21.9	9.4	9.1

1875/85

Category	Belgium	Denmark	France	Germany	India	Italy	Japan	Norway	Switzerland	UK	US	Average
Government Debt(%)	4.3	2.7	7.8	2.1	1.8	13.6	3.7	2.2	2.2	7.2	4.9	4.8
Corporate Bonds(%)	1.5	0.4	4.5	1.0	0.2	1.1	—	—	2.8	4.0	4.2	2.2
Corporate Stocks(%)	6.5	9.2	2.7	1.7	0.2	0.9	0.5	1.7	4.7	4.0	9.2	3.8
Foreign Assets (gross) (%)	—	—	5.1	2.7	—	—	—	—	9.2		0.8	
Foreign Assets (net)(%)	—	2.6	4.9	—	−5.1	−2.4	−3.7	—	4.7	9.7	−2.5	4.3
Total(%)	12.3	14.9	19.9	7.5	—	13.2	0.5	3.9	14.4	24.9	17.8	12.9

Table 4.2. (*Continued*)

1875/85 Category	Belgium	Denmark	Germany	India	Italy	Japan	Norway	Switzerland	UK	US	Average
Government Domestic Debt(%)	6.7	2.5	5.2	1.9	13.1	2.3	3.7	2.3	5.9	2.2	4.6
Corporate Bonds(%)	1.6	0.3	0.4	0.3	1.0	—	—	3.5	6.2	3.4	2.1
Corporate Stocks(%)	5.1	8.8	2.7	0.3	1.2	3.8	3.1	6.2	16.1	9.2	5.7
Foreign Assets (gross)(%)	—	—	4.7	—	—	—	—	12.7	—	0.7	
Foreign Assets (net)(%)	4.7	−2.3	—	−6.1	−2.6	−1.2	—	8.4	14.6	−1.5	5.1
Total(%)	18.1	9.3	13.0	−3.6	12.7	4.9	6.8	20.4	42.8	13.3	15.7

Note: Method of calculation
This data is very crude and can only give a rough indication of the relative importance of securities across different countries at different times. In the use of Goldsmith's data the following assumptions are made:

1. All government debt, corporate stocks and bonds, and net foreign assets are transferable securities (cf. Goldsmith pp. 83, 95, 151, 175–6).
2. Where no net figure for foreign assets is given the gross is used.
3. Where corporate stocks and bonds are grouped together, the assumption is made that they divide equally.

Source: R. W. Goldsmith, *Comparative National Balance Sheets* (Chicago, 1985), tables 34, 35 and appendix A.

In 1870 all financial markets were connected by telephone.

In 1900 there were 350,000 KM of underwater cabbles connecting the major financial markets.

- Major financial centres at the beggining of XXth century:
  - London
  - Paris
  - Berlin
  - New York
  - Amsterdam
  - Tokio
  - Sydney
  - Xangai
  - Joanesburg

2.4. The Capital Markets at the Beggining of 20th Centhury

- Great degree of worldwide integration
- Important role in development, economic growth and sophistication.

Roles performed by markets

- 1) To raise financing for large projects (private or governmental),
- 2) generate liquidity,
- 3) transfer funds among countries,
- 4) make saving applications, and
- 5) develop financial centers.

- Most important exchange: London
- Great reduction in communication costs. Price of phone call London-NY was in 1911 merely 0,5% of cost in 1866.
- Great number of exchanges.

Table 5.2. The leading stock exchanges in the world: (*c.*1914)

Country/ Continent	Number	Examples	Country/ Continent	Number	Examples
Europe	55	—	North America	16	—
Austria/ Hungary	4	Vienna, Budapest, Prague	Canada	3	Montreal, Toronto
Belgium	2	Brussels	USA	13	New York. Boston, Chicago, San Francisco, Philadelphia
Bulgaria	1	Sofia	Latin America	10	—
Denmark	1	Copenhagen	Argentina	1	Buenos Aires
France	5	Paris, Lyons, Marseilles	Brazil	2	Rio de Janeiro
Germany	6	Berlin, Frankfurt	Chile	2	Santiago
Greece	1	Athens	Cuba	1	Havana
Italy	5	Milan, Genoa	Mexico	1	Mexico City
Netherlands	2	Amsterdam	Peru	1	Lima
Norway	1	Oslo	Uruguay	1	Montevideo
Portugal	1	Lisbon	Venezuela	1	Caracas
Rumania	1	Bucharest	Asia	14	—
Russia	5	St. Petersburg, Warsaw, Moscow	Burma	1	Rangoon
Serbia	1	Belgrade	Ceylon	1	Colombo
Spain	2	Madrid, Barcelona	China	2	Shanghai
Sweden	1	Stockholm	India	3	Bombay, Calcutta
Switzerland	4	Geneva, Zurich	Indonesia	1	Batavia
United Kingdom	10	London, Liverpool, Manchester, Glasgow	Japan	3	Tokyo, Osaka, Yokohama
Africa	11	—	Malaya	2	Singapore
Egypt	2	Alexandria	Turkey	1	Istanbul
Morocco	1	Casablanca	Australasia	15	—
Mozambique	1	Beira	Australia	12	Melbourne, Sydney
Rhodesia	2	Bulawayo	New Zealand	3	Wellington
S. Africa	5	Johannesburg	Total	106	—

Sources: H. Lowenfeld, 'The World's Stock Markets', *Financial Review of Reviews* October 1907, pp. 12–13; S. S. Huebner, 'The Scope and Functions of the Stock Market', in *Annals of the American Academy of Political and Social Science*, 35 (1910), p. 20; J. E. Meeker, *The Work of the Stock Exchange* (rev. edn) (New York, 1930), pp. 540–1.

But differente models of the relation with governments and banks

- A) Self regulation and no bank members [brookers and members] (e.g. London and Amesterdam).
- B) Self regulation with no institutional members (e.g. New York)
- C) State regulation with hibrid bank membership (e.g. Paris)
- D) State regulation with strong participation of banks (e.g. Germany)

Evolução dos investimentos em acções até imediatamente antes da primeira guerra mundial.

Table 5.3. Composition of corporate stock outstanding: United States, 1860–1912

Category	1860	1900	1912
Railroads (%)	15	39	26
Public utilities (%)	13	7	7
Banking/Insurance (%)	39	20	15
Manufacturing/Mining (%)	33	34	52
Total stocks	$0.7 billion	$11.2 billion	$32.0 billion
Total bonds	$0.5 billion	$7.1 billion	$18.1 billion

Note: The percentages are based on the total corporate stocks outstanding whilst the total for both stocks and bonds only include those issued by non-financial corporations.

Source: R. W. Goldsmith (ed.), *Institutional Investors and Corporate Stock* (NBER, 1973), pp. 38, 45.

2.5. Crisis, Crashes, and Control [1914-1939]

Nem os governos nem os mercados financeiros se encontravam preparados para as consequências financeiras da 1ª guerra mundial.

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- The first great war had a great impact on economies and societies, and therefore capital markets.

- Many capital exchanges were initially closed (London, Paris, Germany, New York).