Analysis of financial markets during different time periods.

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Tuteurs de stage:

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Commodity option pricing efficiency before Black, Scholes, and Merton

Chambers, D., & Saleuddin, R.

Objectives :

Black and Scholes in 1973 allowed traders to price options more accurate.

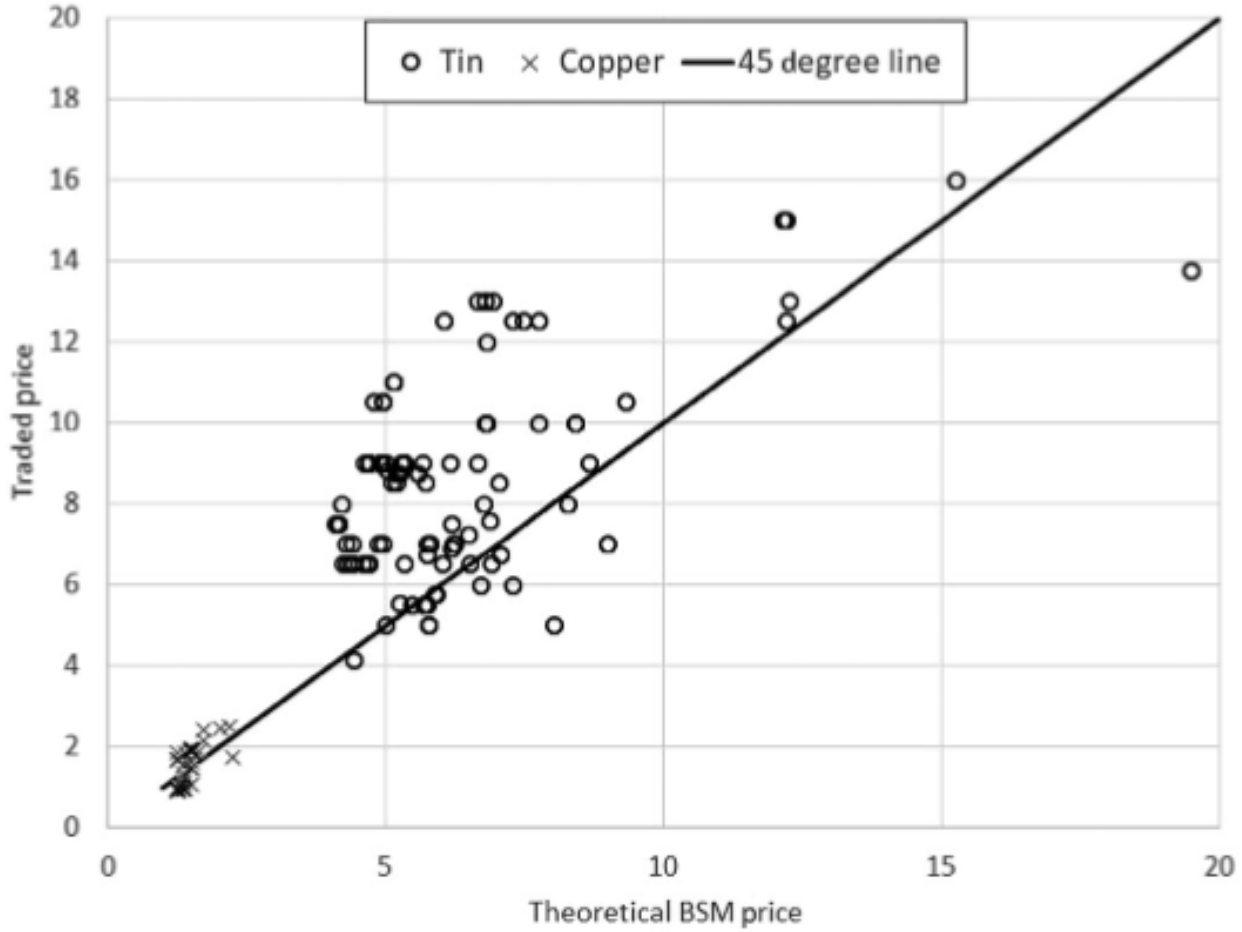
Option markets made their first appearance in the 18th century on Amsterdam.

The question is how investors were valuing these financial products and did they succeed in their results?

Methodology :

- Lack of data: because of this study analyze market on the beginning of the 20th century, trades were not always listed.
- Consequently, few studied have been done by historian and economist: only 2 dataset have been analyzed.

- This study examine the dataset of **John Maynard Keynes** a famous economist whose ideas fundamentally changed the theory and practice of macroeconomics and the economic policies of governments.
- This dataset is mainly composed of commodities
- Keynes traded coper and tin on the London Stock Exchange between 1921 and 1931.
- Dataset composition: 241 trades
  - 40 for coper
  - 95 for tin



Results :

Periods: 1921-1931
Average error(x):1.1
Average error(%): 15

	(1)	(2)	(3)	(4)
Historical volatility coefficient	0.781***		0.627***	0.508***
	(0.062)		(0.095)	(0.075)
Realized volatility		0.594***	0.235***	0.265***
		(0.076)	(0.089)	(0.060)
Tin dummy				0.045***
				(0.005)
Intercept	0.058***	0.082***	0.047**	0.028***
	(0.008)	(0.011)	(0.009)	(0.007)
N obs.	135	135	135	135
Adj. R^2	0.64	0.42	0.68	0.82

Results : Ordinary Least Square

Conclusion and novelties :

- traders of tin and copper options in the 1920s transacted with Keynes via his broker at prices fairly close to their BSM theoretical values.

- any changes in trades' theoretical values, characterized by implied volatility, were associated with changes in observable parameters (historical volatility) and expectations (proxied by realized volatility).

So, what are the limits?

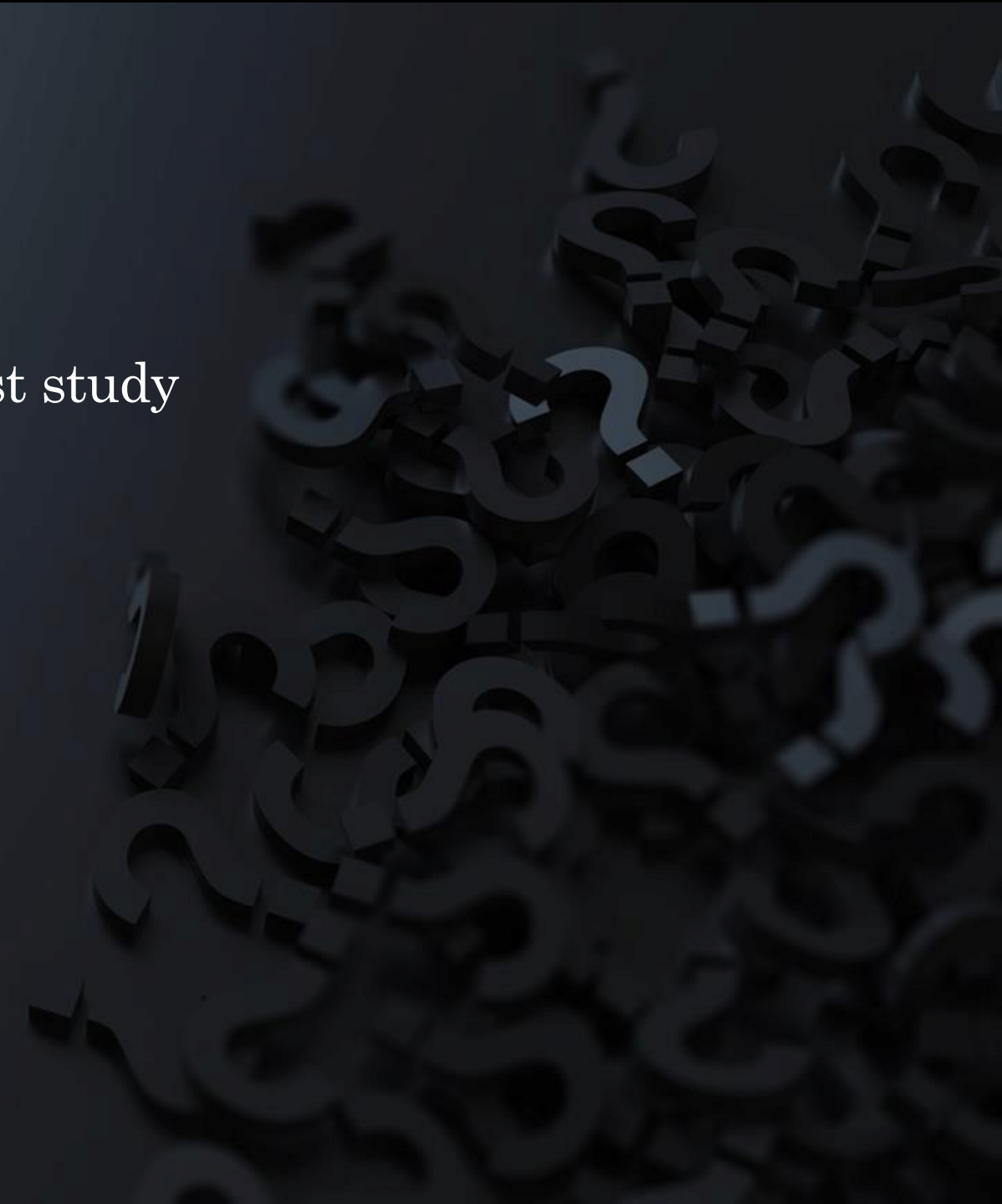
Derivative Pricing 60 Years before Black–Scholes: Evidence from the Johannesburg Stock Exchange

LYNDON MOORE and STEVE JUH

Problem

Same question we discuss on the first study

The period change, the place also



Methodology :

15 warrants in the sample:

- 11 golds
- 2 silvers
- 1 diamond
- 1 alkali

10 call options from the African Share Agency

All the transactions have been taken from local newspapers

Warrants:

$$W = \left(\frac{N}{N+M}\right)\left[\left(S - \sum_i e^{-rt_i} D_i + \frac{M}{N} W\right) N(d_1) - e^{-rT} X N(d_2)\right],$$

where

$$d_1 = \frac{\ln\left(\dfrac{S - \sum_i e^{-rt_i} D_i + \frac{M}{N} W}{X}\right) + rT}{\sigma\sqrt{T}} + \frac{\sigma\sqrt{T}}{2}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

Call Options:

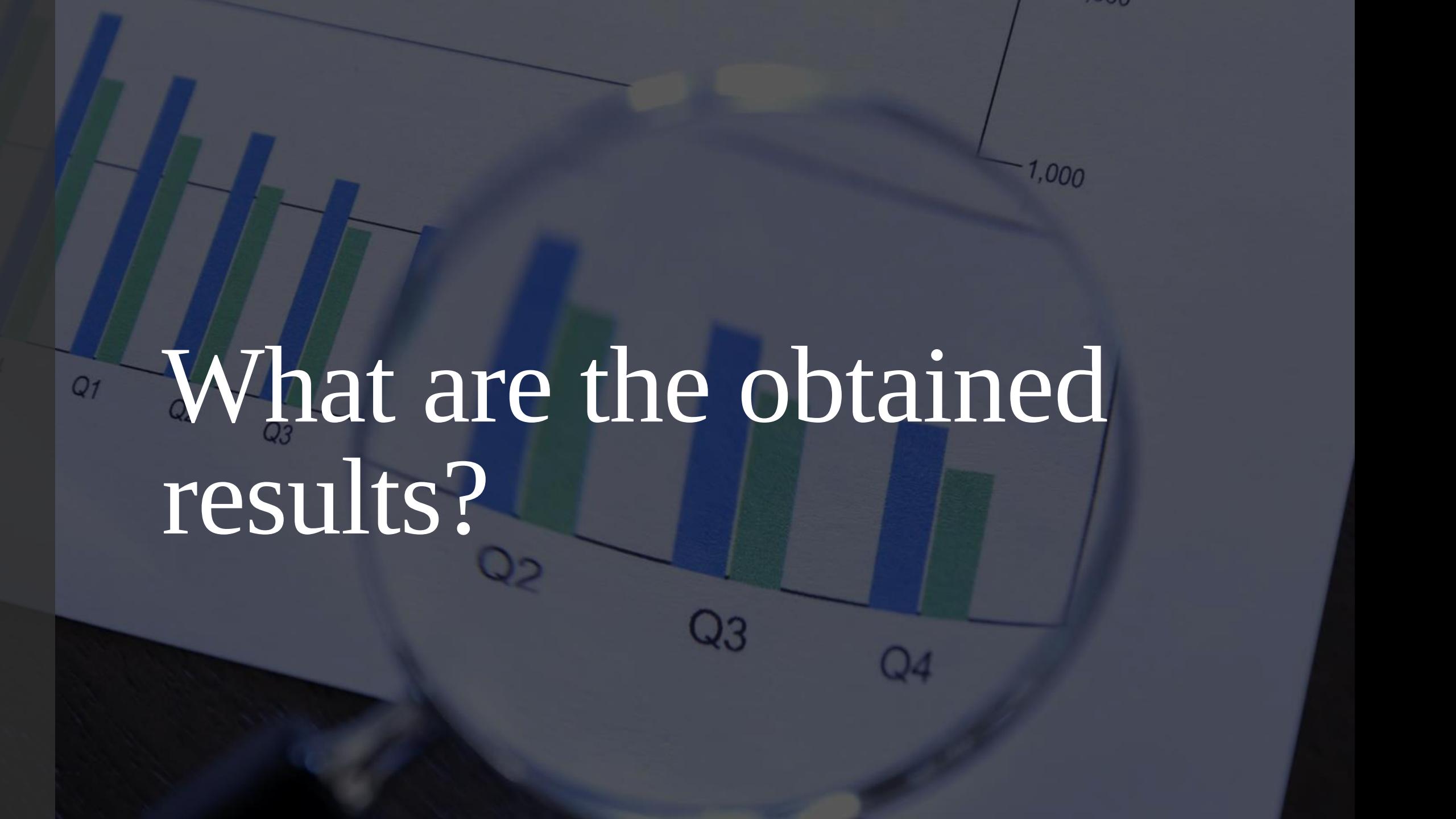
Black-Scholes model

Using a derivate of Black&Schole's formula

2 volatilies was used:

-the « perfect foresight volatility »

-the previous 90 days volatility



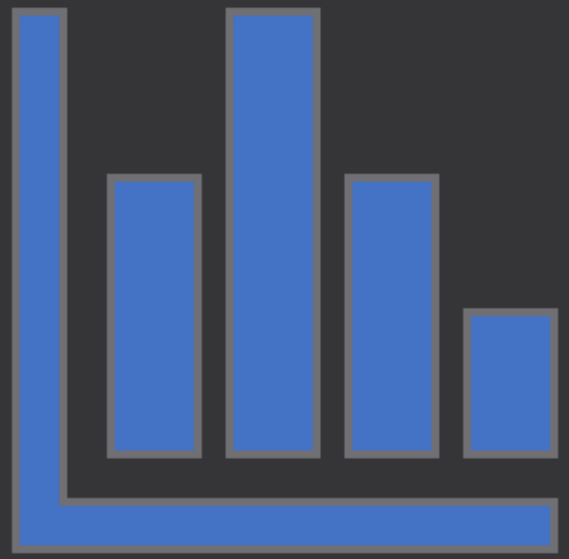
What are the obtained results?

	Perfect Foresight Volatility			Previous 90 Days' Volatility		
	Shillings	Percent	σ^2	Shillings	Percent	σ^2 (Range)
Bantjes Consolidated	0.9	2.4	0.39	1.1	3.1	0.19–0.54
Vogelstruis Cons. Deep	1.6	12.7	0.73	1.1	8.7	0.43–0.98
South Randfontein Deep	0.4	20.5	0.63	0.6	30.4	0.47–1.00
Daggafontein 3	1.8	23.3	0.31	1.8	23.2	0.15–0.51
Daggafontein 4	0.9	31.2	0.50	1.1	40.7	0.36–0.71
Daggafontein 5	1.1	28.6	0.62	1.8	46.8	0.36–1.27
Modderfontein East 3	1.0	16.0	0.40	1.2	18.5	0.20–0.68
Modderfontein East 4	1.5	20.0	0.43	1.7	23.9	0.20–0.74
West Springs	1.7	30.5	0.44	2.1	38.0	0.24–0.73
Southern Van Ryn	1.3	85.4	0.46	1.3	85.7	0.37–0.52
Geduld Proprietary	3.3	25.3	0.31	3.4	26.0	0.15–0.50
Transvaal Silver	1.5	3.7	0.88	1.1	2.7	0.54–1.89
Pretoria Silver	0.7	137.3	2.16	0.7	138.2	1.31–3.09
Frank Smith	0.6	17.0	0.90	0.6	17.8	0.50–1.31
South African Alkali	2.2	27.1	0.97	2.8	34.0	0.52–1.41
Average		23.7			27.4	

Warrants

Company	# Quotes	January 1908 to September 1909			August 1910 to May 1911		
		% Exercised	% Payoff	% Mispricing	% Exercised	% Payoff	% Mispricing
Randfontein Estates	409	39.8	85.2	24.2	41.7	27.8	53.3
African Farms	390	55.6	71.7	36.0	32.9	13.0	62.0
Cons. Main Reef	386	55.4	68.4	32.1	33.5	16.5	65.5
South African Land	366	47.1	64.5	33.9	17.9	7.9	51.1
Knight Central	342	46.3	62.0	33.1	14.8	8.7	55.7
Lace Proprietary	289	38.8	105.3	32.0	18.8	5.6	57.3
Lydenburg Farms	285	49.0	54.2	42.9	12.9	3.4	67.7
Jupiter	274	53.8	76.1	26.3	5.9	2.1	43.6
East Rand Central	264	53.7	82.0	32.6	26.1	12.9	48.1
Benoni	251	34.3	14.6	34.0	31.6	11.9	63.6

Call options



How important are these results ?

Table II

JSE Warrant Mispricing—1909 to 1922

We calculate the numbers in the shillings columns by averaging $|W_{BS} - W_{market}|$ over all o
tions. We calculate the numbers in the percent column, the average absolute percentage mis
by dividing the number in the shillings column by the average warrant price and multipl
100. We present the volatility measure we use for each warrant in the σ^2 perfect foresight
ity column, and the low-to-high range of volatility measures we use in the σ^2 previous 9
volatility column. We use the annualized standard deviations of equity returns, measured
lives of each warrant, in the perfect foresight columns. We use the annualized standard dev
of equity returns, measured over the previous 90 days, in the previous 90 days' volatility c
For those warrants that were extended, we calculate the average mispricing over all obser
We switch from a Black–Scholes price, using the initial expiration date, to the extended dat
date the extension is announced when the extension is free, and the date the extension "pa
is made for the South African Alkali and Southern Van Ryn warrants. Model prices for the
Proprietary warrant are calculated using a binomial tree with 100 steps to allow for the pos
of early exercise, since Geduld Proprietary was the only stock that paid dividends.

	Perfect Foresight Volatility			Previous 90 Days' Volat		
	Shillings	Percent	σ^2	Shillings	Percent	σ^2 (
Bantjes Consolidated	0.9	2.4	0.39	1.1	3.1	0.1
Vogelstruis Cons. Deep	1.6	12.7	0.73	1.1	8.7	0.4
South Randfontein Deep	0.4	20.5	0.63	0.6	30.4	0.4
Daggafontein 3	1.8	23.3	0.31	1.8	23.2	0.1
Daggafontein 4	0.9	31.2	0.50	1.1	40.7	0.3
Daggafontein 5	1.1	28.6	0.62	1.8	46.8	0.3
Modderfontein East 3	1.0	16.0	0.40	1.2	18.5	0.2
Modderfontein East 4	1.5	20.0	0.43	1.7	23.9	0.2
West Springs	1.7	30.5	0.44	2.1	38.0	0.2
Southern Van Ryn	1.3	85.4	0.46	1.3	85.7	0.3
Geduld Proprietary	3.3	25.3	0.31	3.4	26.0	0.1
Transvaal Silver	1.5	3.7	0.88	1.1	2.7	0.5
Pretoria Silver	0.7	137.3	2.16	0.7	138.2	1.3
Frank Smith	0.6	17.0	0.90	0.6	17.8	0.50–1.31
South African Alkali	2.2	27.1	0.97	2.8	34.0	0.52–1.41
Average		23.7			27.4	

Table IX

Modern JSE Derivative Pricing—2001 to 2003

We average $|C_{BS} - C_{market}|$ over all observations in the Rand column. We obtain the numbers in the percent column, the average absolute percentage mispricing, by dividing the number in the Rand column by the average price of the derivative and multiplying by 100. We present the volatility measure we use for each derivative in the σ^2 perfect foresight volatility column, and the low to high range of volatility measures we use in the σ^2 previous 90 days' volatility column. We use the annualized standard deviation of common stock returns, calculated over the duration of the derivative's life, as our volatility parameter in the perfect foresight columns. We use the annualized standard deviation of common stock returns, calculated over the previous 90 days, as our volatility parameter in the previous 90 days' volatility columns.

	Perfect Foresight			Previous 90 Days' Volatility		
Call Option/Warrant	Rand	Percent	σ^2	Rand	Percent	σ^2 (Range)
Anglo Gold CB	13.8	52.7	0.39	10.1	38.8	0.38–0.46
Durban Roodepoort CA	3.0	39.5	0.75	2.0	26.6	0.56–1.27
Durban Roodepoort CB	4.2	57.6	0.73	2.9	40.2	0.56–1.18
Goldfields CA	7.1	43.4	0.61	4.5	27.5	0.49–1.00
Goldfields CD	6.6	62.2	0.54	5.8	54.4	0.49–0.64
Goldfields CE–SB	0.9	5.0	0.54	1.0	6.0	0.49–0.64
Harmony Warrant	4.3	6.4	0.67	5.0	7.3	0.33–1.01
Harmony CA–IB	9.6	40.4	0.63	5.7	24.1	0.45–1.01
Harmony CB	10.2	34.0	0.55	5.7	27.6	0.45–0.65
Anglo American CB	3.6	43.0	0.43	2.1	25.8	0.31–0.58
Anglo American CE–IB	5.5	46.7	0.39	2.8	23.8	0.31–0.58
Anglo American CE–SB	4.3	41.0	0.34	3.9	37.0	0.31–0.45
Ang.Amer. Platinum CB–IB	17.8	51.4	0.35	16.8	48.4	0.28–0.51
Ang.Amer. Platinum CC	17.6	45.5	0.39	24.0	62.0	0.28–0.42
Ang.Amer. Platinum CD	8.1	46.3	0.39	12.2	69.7	0.28–0.42
BHP Billiton CA	1.3	56.9	0.33	1.0	44.4	0.32–0.39
Impala Platinum CA	7.6	9.5	0.46	7.1	9.1	0.35–0.53
Impala Platinum CC	12.5	28.1	0.44	19.7	43.5	0.35–0.46
Kumba Resources C1	1.8	56.4	0.44	1.7	51.7	0.30–0.54
Average		36.2			29.7	

The novelties ?

ASF's investors were surprinsigly accurate for warrants

A bit more complicated for call options (an investor would have lost 47% of each pound spent on purchasing call options)

The pricing of options and corporate liabilities

By Fisher Black and Myron Scholes

Objectives

Option market became voluminous throughtout the years

Investors had the necessity to price its fairly and correctly

a) The short-term interest rate is known and is constant through time.

b) The stock price follows a random walk in continuous time with a variance rate proportional to the square of the stock price. Thus the distribution of possible stock prices at the end of any finite interval is log-normal. The variance rate of the return on the stock is constant.

c) The stock pays no dividends or other distributions.

d) The option is "European," that is, it can only be exercised at maturity.

e) There are no transaction costs in buying or selling the stock or the option.

f) It is possible to borrow any fraction of the price of a security to buy it or to hold it, at the short-term interest rate.

g) There are no penalties to short selling. A seller who does not own a security will simply accept the price of the security from a buyer, and will agree to settle with the buyer on some future date by paying him an amount equal to the price of the security on that date.

Conditions of application :

$$\mathrm{C} = \mathrm{S}_t N(d_1) - K e^{-rt} N(d_2)$$

where:

$$\mathrm{d}_1 = \frac{ln\frac{S_t}{K} + (r + \frac{\sigma_v^2}{2})\ t}{\sigma_s\ \sqrt{t}}$$

and

$$\mathrm{d}_2 = d_1 - \sigma_s\ \sqrt{t}$$

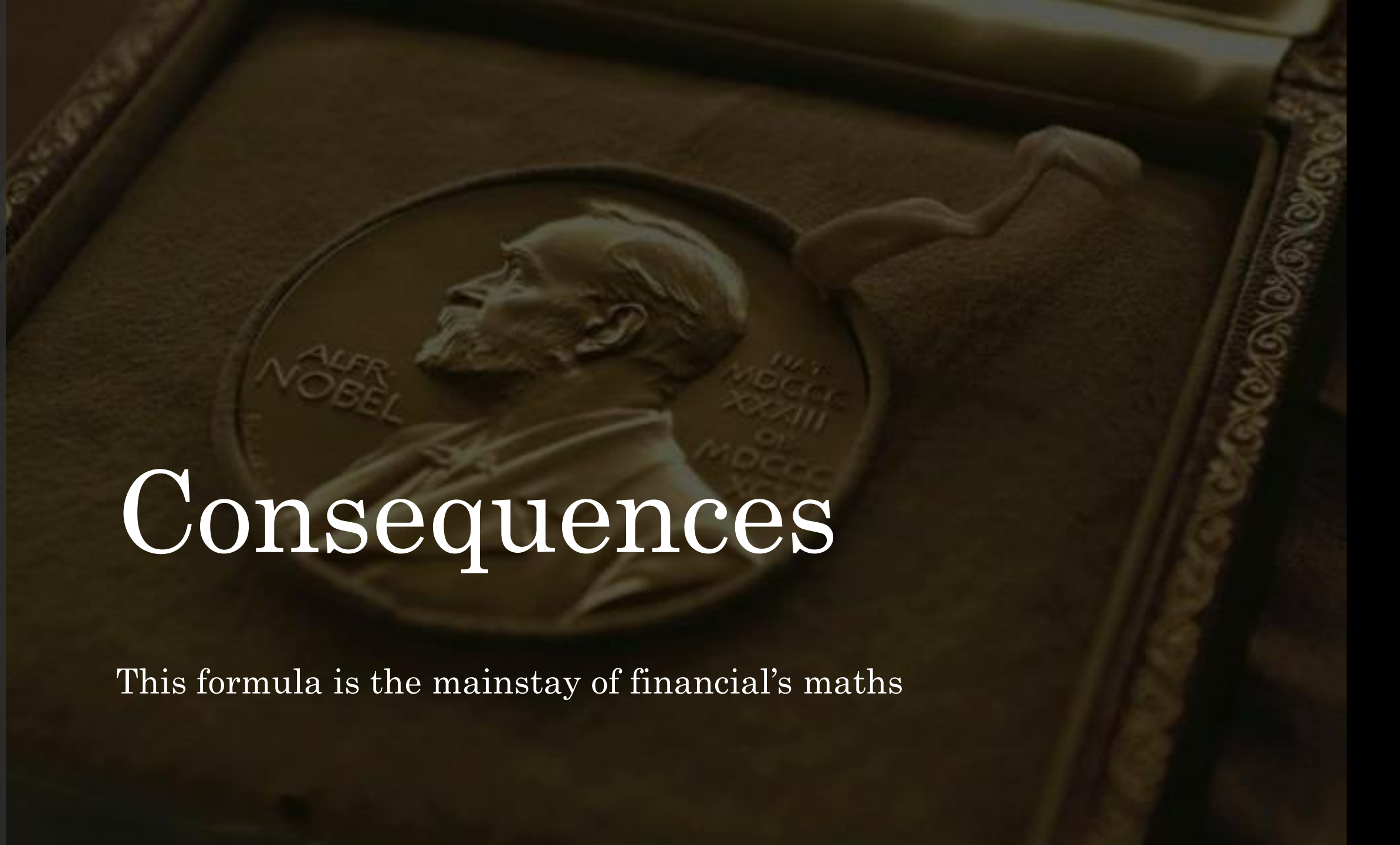
Final equation

Black&Scholes' formula for other financial products :

for a put : $$P = Ke^{-rt}N(-d_2) - S_0e^{-qT}N(-d_1)$$

for a warrant : seen on previous study

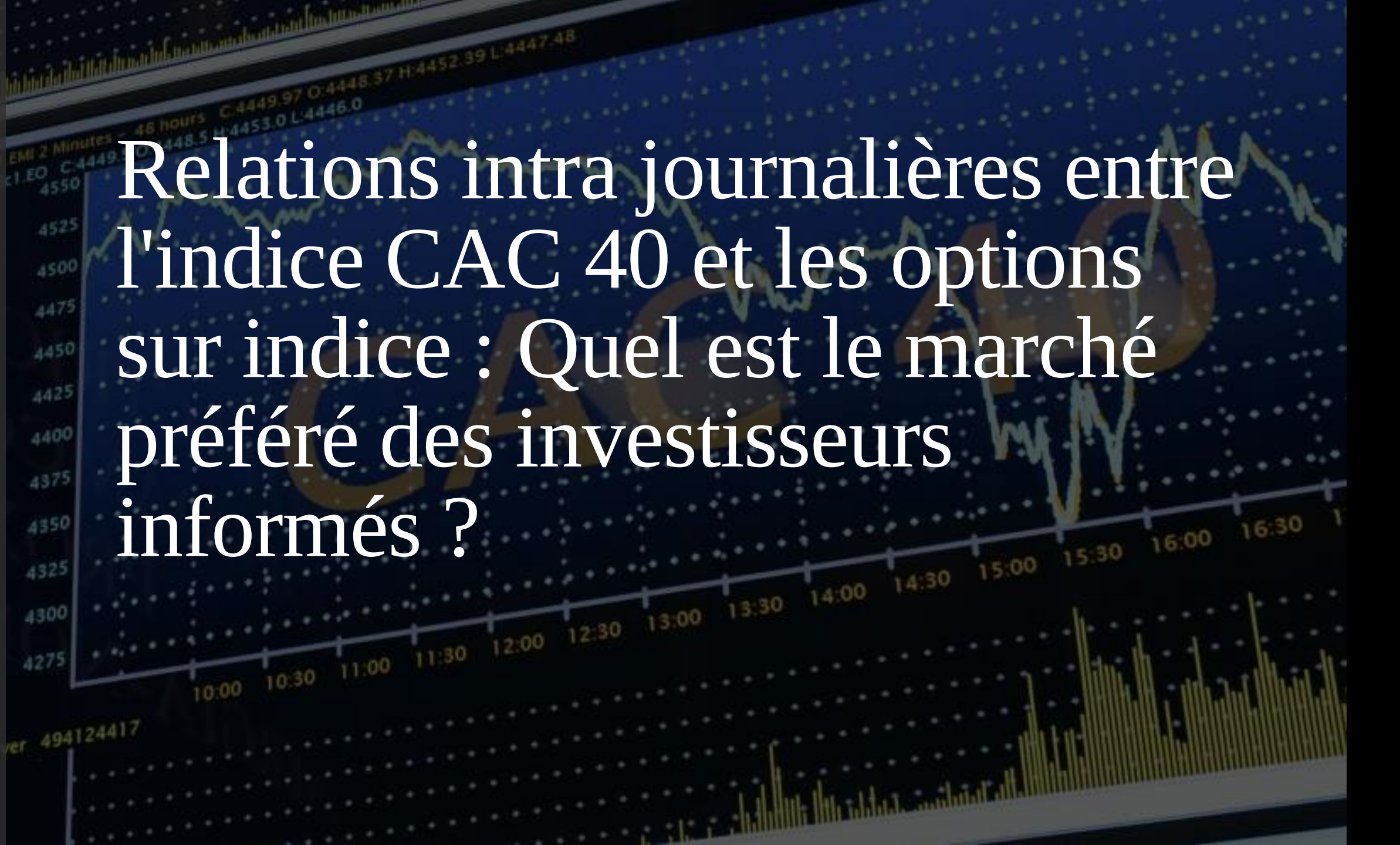
for an american option : in some conditions, same as european options



Consequences

This formula is the mainstay of financial's maths


#NFLX
Lots: 0.1
T/S: 0
S/L: 0
T/P: 0
274.95
275.01
Vente
6.0
Achat
Positions ouvertes
(aucun)
Chart controls
GRD TRD MRK LDR
BID ASK PER VOL HST
HL0 HL1 HLS PVT CNT
HSC VSC
Symbol information
+0.86%
+234.0 pips
278.57
272.50
Trend
Strength
What are the limits ?



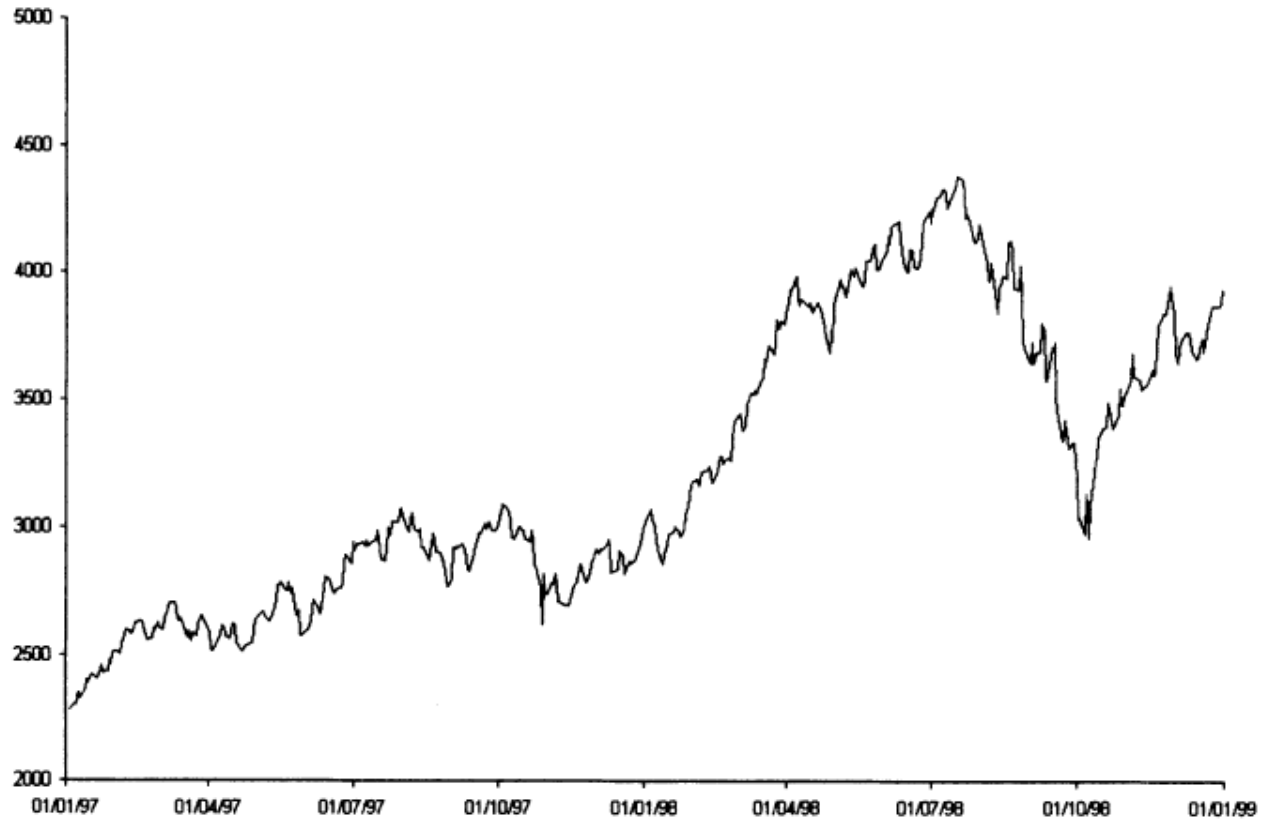
Relations intra journalières entre l'indice CAC 40 et les options sur indice : Quel est le marché préféré des investisseurs informés ?

Objectifs de l’étude :

Déterminer si le marché option en France (MONEP) est dominé par des investisseurs informés (spéculateurs)

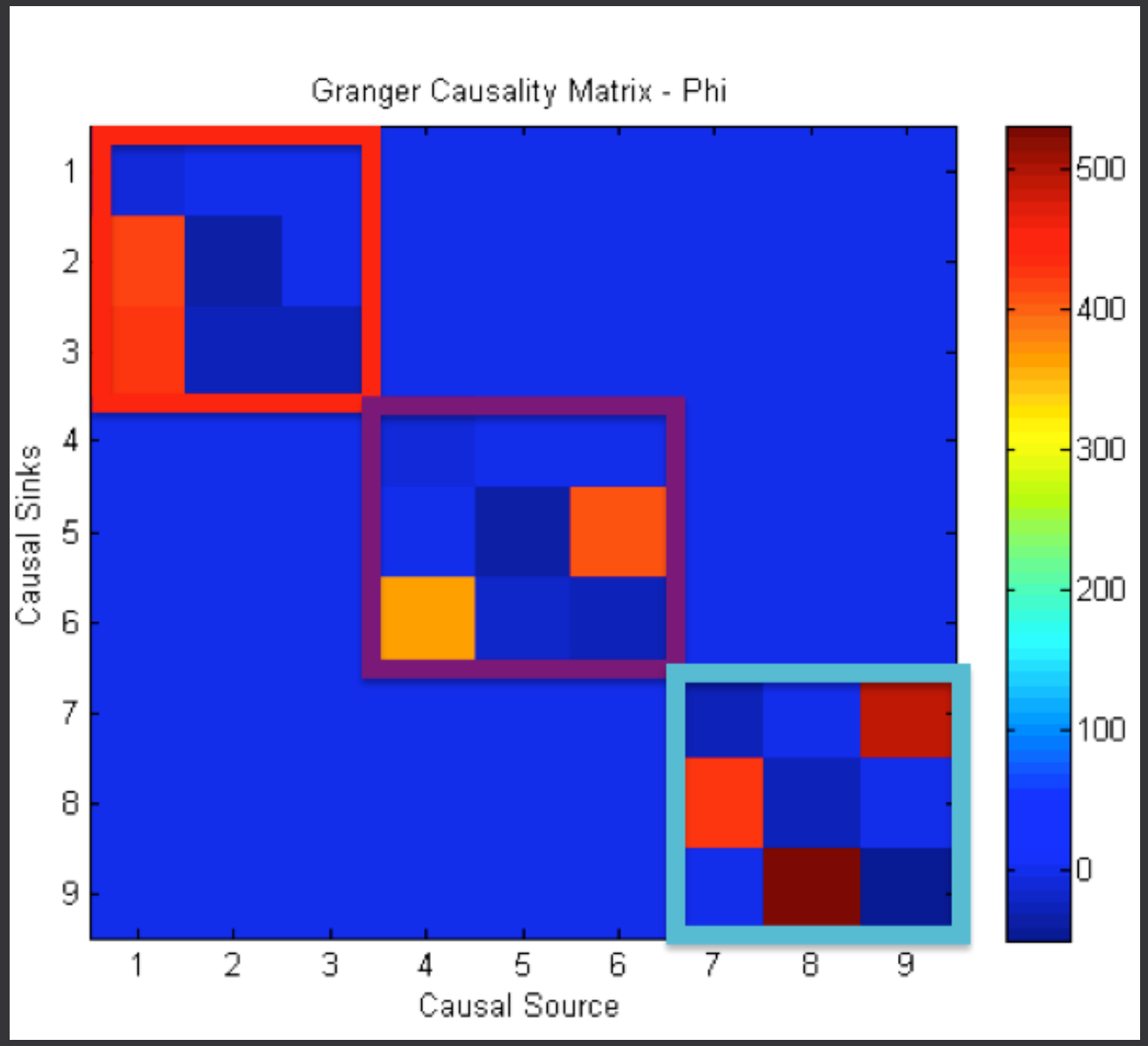
FIGURE 1

Évolution de l'indice CAC 40 entre 1997 et 1998. L'indice CAC 40, constitué de 40 valeurs françaises du Premier Marché de la Bourse de Paris, est calculé en continu par ParisBourse SA et diffusé toutes les 30 secondes (base 1 000 au 31/12/1987)



Données et méthodologie :

la base de données de cette étude contient toutes les transactions effectuées sur le MONEP sur 23 mois



Analyse de causalité au sens de Granger

(causalité linéaire et non linéaire)

3 hypothèses de départ

Résultats et importances :

- **L’hypothèse selon laquelle le MONEP serait dominé par la présence d’investisseurs informés n’est donc pas vérifiée**

- Causalité linéaire :

- Causalité non linéaire :

- Meilleure compréhension de la chaine de transmission de l’information

Merci