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**LECTURE**


**24 SEPTEMBER**

**9:00-10:00AM**

**MATH3/4/68181**

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"EXTREME VALUES" & "FINANCIAL RISK"



Lecture times: Mon 9-10 am Cordingley Th  
Tues 9-10am Roscoe B

( MATH 38181 )

Fri 10-11am ATB

( MATH 48181 / 68181 )

Example class: Mon 12-13 ATB 6107

Tues 16-17 Chem 654

(Attend only 1 of these)

Website:

[https://minerva.it.manchester.ac.uk/~sarales/  
extremes3.html](https://minerva.it.manchester.ac.uk/~sarales/extremes3.html)  
(MATH 38181)

..... /extremes 4. html (MATH 48181)

..... /extremes 6. html (MATH 68181)

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WELCOME  
(BACK)  
TO  
MANCHESTER!

EMAIL: MBB555N2@MANCHESTER.AC.UK

PHONE: 0161 275 5912

OFFICE: ATB 2.223

MON - FRI 11AM - 5PM (NO APPOINTMENT  
NEEDED)

WEEKENDS BY APPOINTMENT

EMAIL: 24/7

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- podcasted
- scanned handwritten notes

I WILL NOT USE BLACKBOARD.

Credits - 10 Math 38181

15 Math 48181

15 Math 68181

Pre-requisites - Math 20802 (Stat Methods)

- Statistical Inference

(not essential you  
take this course)

Assessment - 5 quizzes each worth 2 marks

- in-class test 10 marks

- final exam 80 "

WHAT IS THE

PURPOSE OF THIS

COURSE ?

1) minimize the chance of financial disasters happening

2) try to identify anomalies in financial markets (eg. using machine learning)

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# Extreme Values

What is an extreme value?

I will give you

3 different definitions

of an "extreme value"

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## Definition 1

Suppose  $X_1, X_2, \dots, X_n$  are IID with cumulative distribution function (CDF)  $F(\cdot)$ . The extreme value is

$$M_n = \max(X_1, \dots, X_n).$$

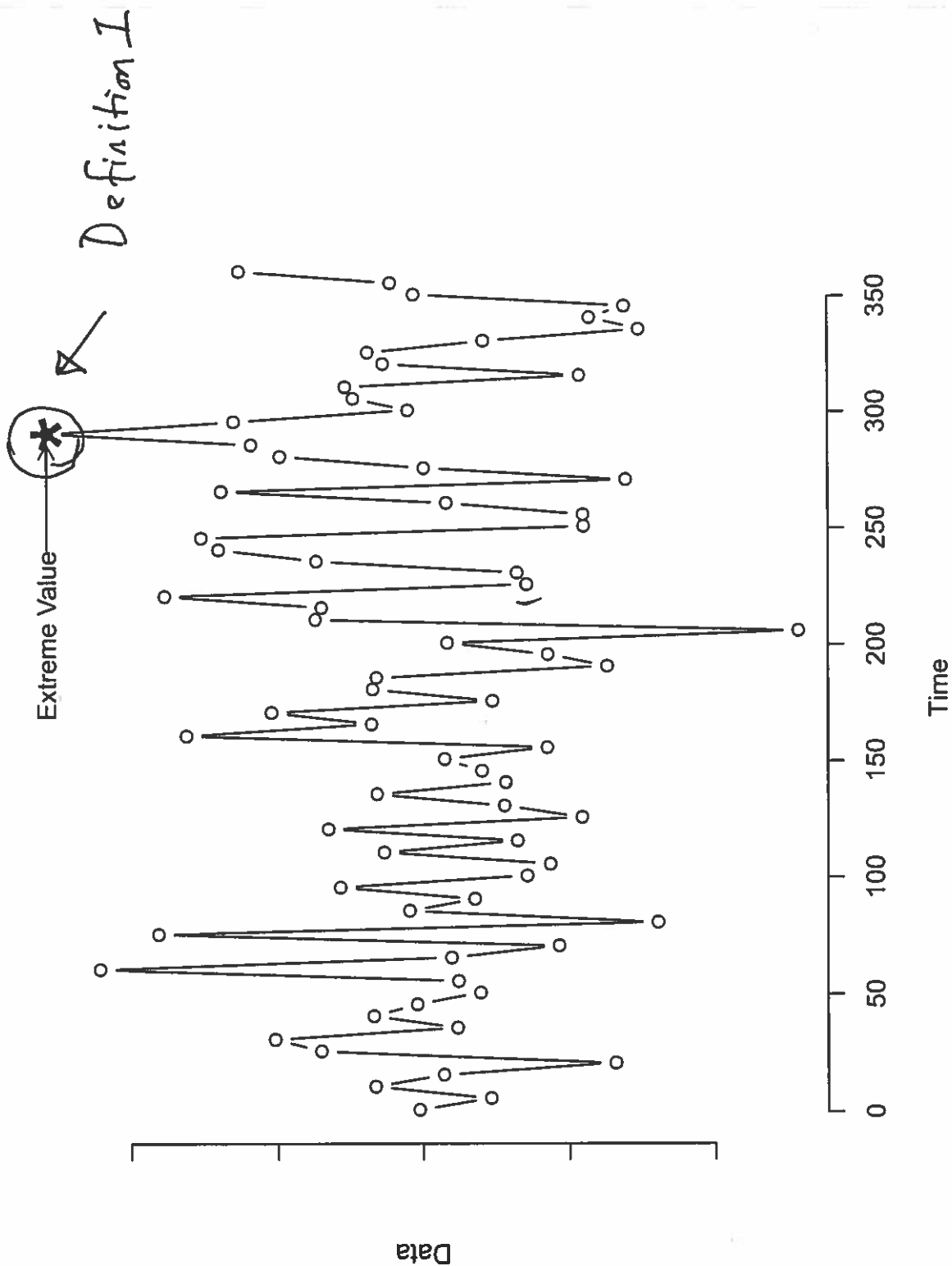
For modeling purposes, we need to know the distribution of  $M_n$

$$\begin{aligned} & P(M_n < x) \\ &= P(\max(X_1, \dots, X_n) < x) \\ &= P(X_1 < x, \dots, X_n < x) \\ &\stackrel{\text{indep}}{=} P(X_1 < x) \cdots P(X_n < x) \\ &\stackrel{\text{identical}}{=} F(x) \cdots F(x) \\ &= [F(x)]^n \end{aligned}$$

What is the limit of  $P(M_n < x)$  as  $n \rightarrow \infty$ ?

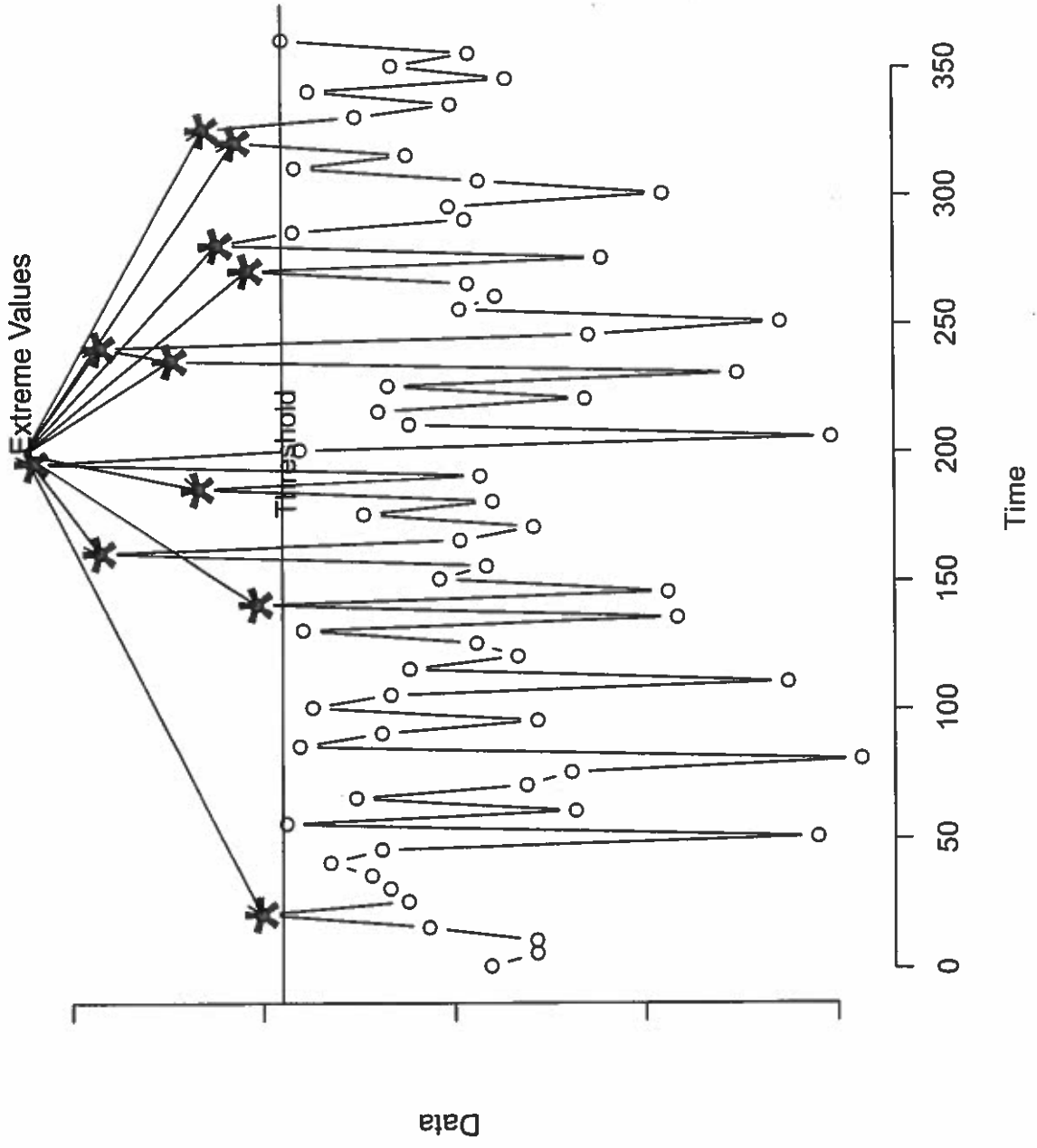
$$\lim_{n \rightarrow \infty} P(M_n < x) = \lim_{n \rightarrow \infty} [F(x)]^n = \begin{cases} 0 & \text{if } F(x) < 1 \\ 1 & \text{if } F(x) = 1 \end{cases}$$

THIS IS NOT A USEFUL RESULT



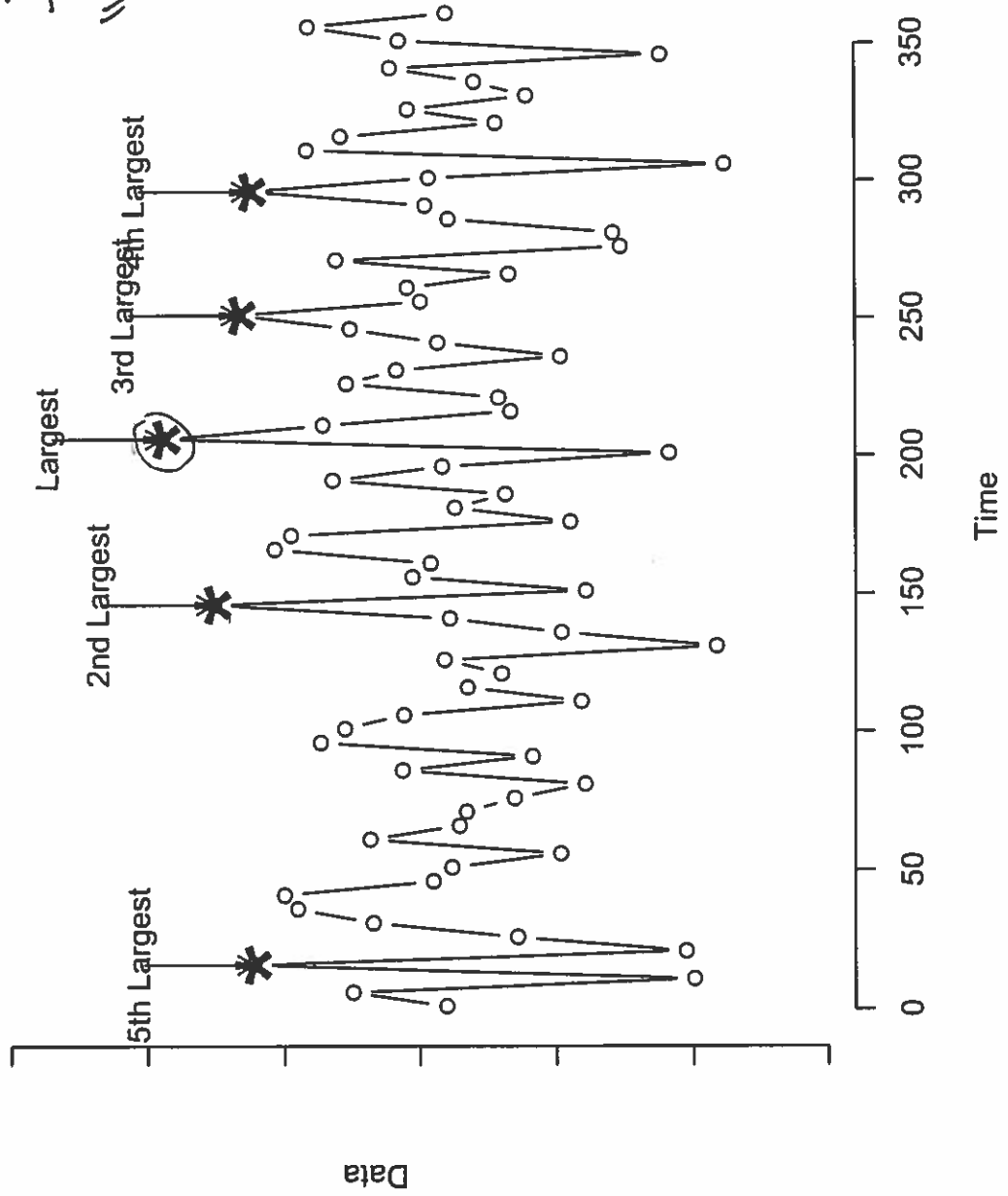


Definition 2



# Definition 3

"r largest"  
( $r=5$ )

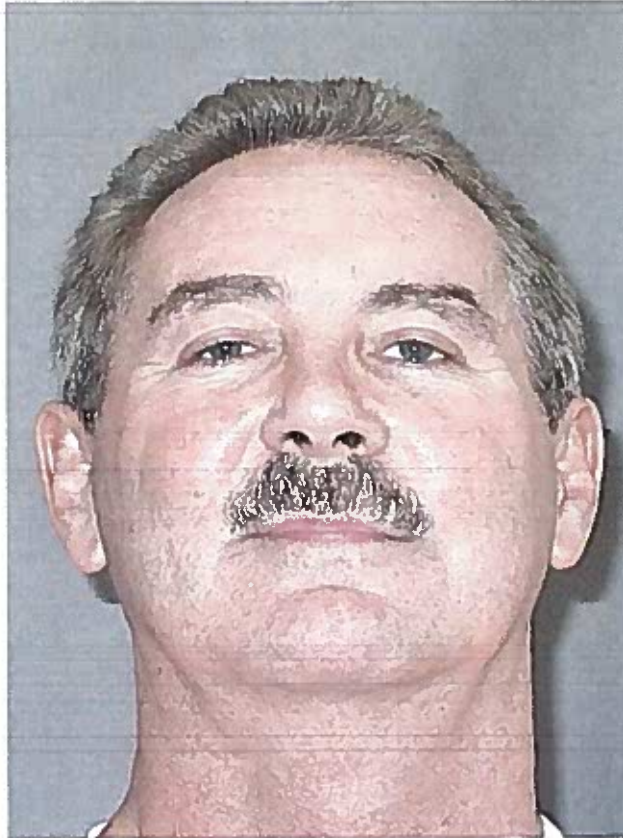




# Jeff Skilling

Jeff was the CEO of Enron Corp. He was convicted of federal felony charges relating to Enron's financial collapse and is currently serving 14 years prison sentence.

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# **Allen Stanford**

Stanford is serving a 110 year prison sentence, having been convicted of charges of fraud. Stanford was the chairman of the now defunct Standord Financial Group of companies.

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# Jordan Belfort

Belfort founded the brokerage firm Stratton Oakmont, and went on to defraud investors through sales of stock while employing more than 1,000 people. The firm was shut in 1998. Belfort was charged with money laundering and fraud.

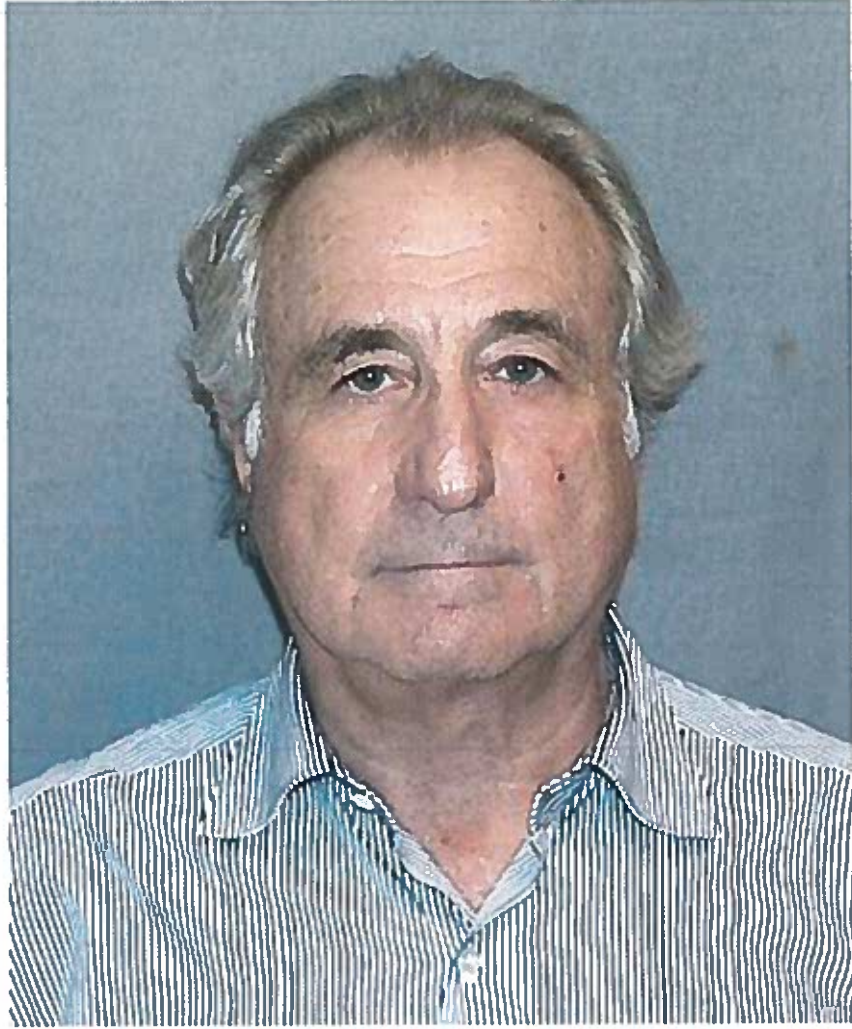
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## **Bruno Iksil**

Former trader for JPMorgan Chase & Co and also known as “the London Whale”. His position in the credit default swap market caused more than \$6.2 billion in losses for the firm in 2012.

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# **Bernard Madoff**

Former stockbroker and investment adviser. His name is connected to the most well known Ponzi scheme fraud. He earned \$62 billion through such fraud and is currently sentenced to a maximum of 150 years in prison.

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## **Ivan Boesky**

Boesky is a former American stock trader who is notable for his prominent role in a Wall Street insider trading scandal that occurred in the US in the mid-1980s. In 1987, Boesky was sentenced to 3 years in prison.

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## **Barry Minkow**

Founded ZZZZ Best which appeared to be an immensely successful carpet cleaning and restoration company. However, it was actually a front to attract investment for a massive Ponzi scheme. It collapsed in 1987 costing investors and lenders \$100 million.

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# Martha Stewart

Martha is an American businesswoman, writer and television personality. In 2004, Stewart was convicted relating to the ImClone insider trading affair and sentenced to prison.

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## **Bernard Ebbers**

A Canadian born businessman and cofounded the telecommunications company WorldCom. In 2005, he was convicted of fraud and conspiracy as a result of WorldCom's false financial reporting. He was sentenced to 25 years for his role in an \$11 billion accounting fraud. It is the largest accounting scandal in US history.

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## **Donald Johnson**

Executive of stock exchange for Nasdaq's. Convicted in 2011 of using insider information to trade shares of United Therapeutics, Honda and other companies from 2006 to 2009. He was sentenced to 3 and half years in prison for a total of \$755,000 of fraud.

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## **Doug Whitman**

Managing more than \$100 million through his Whitman Capital hedge fund. He was convicted in August 2012 of insider trading charges involving stocks of Google, Polycom and Marvell Technology Group. The total value of his fraud accumulated to \$1 million and lead to 2 years in prison.

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# Raj Rajaratnam

Former head of Galleon Capital. He received the longest insider trading sentence in history of 11 years for securities fraud and five counts of conspiracy. He was ordered to pay back the \$53.8 million of fraud.

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## **Albert H. Wiggin**

Career spanning from head of Chase National Bank and now JP Morgan chase. He shorted his own company with 40000 shares in 1929 and profited immensely to the tune of \$4 million and wasn't even found guilty of breaking any laws.

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