

Centre international de formation européenne
DEFI

RISK

WHAT IS RISK ALL ABOUT?

“CONVERTING RISKS INTO SPRINGBOARDS OF SUCCESS”

CIFE SEMINAR ROMA-BERLIN-NICE 2023-24
MICHEL-HENRY BOUCHET

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CAN YOU PREDICT RISK?
RISK = UNCERTAINTY = INFORMATION DEFICIT

Images: Bolsonaro, De Ferrado, NO MAY COMIDA, a line graph, a bar chart, a person with a flag, and a person on a phone.

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2 TYPES OF CRISES:

Type 1 Crisis
It emerges brutally, its timing cannot be anticipated, and it requires drastic adjustment

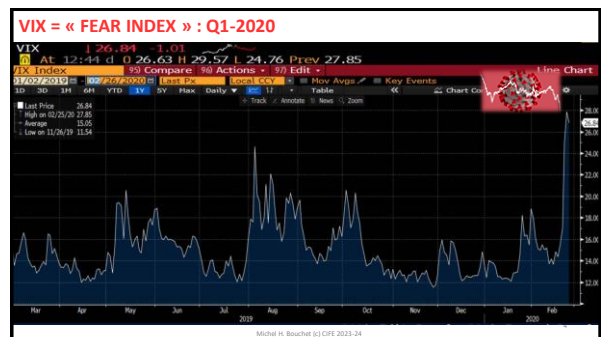
- 1929 crisis
- 1973 OPEC oil crisis
- 12/2004 Asian tsunami
- 2011 earthquake-driven Fukushima disaster
- Twin Towers 1/11
- Turkish lira crisis 04/2021

Type 2 Crisis
It emerges brutally, it is unprecedented but probable, and it could have been expected

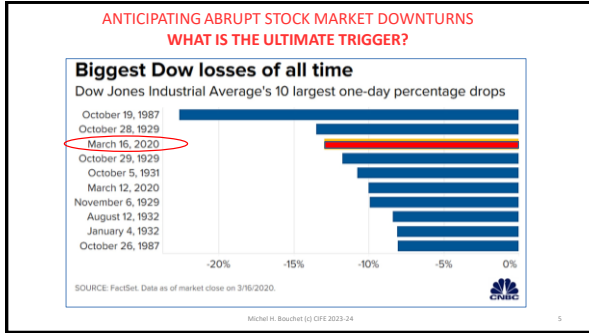
- 1985 EMCs debt crisis
- 1986 Chernobyl
- 1999 Asian banking crisis
- 2008 financial crisis
- Covid-19** (CIA 2005 report, Bill Gates 2015 TED talk, 2016 World Bank Facility, Obama 2016 pandemic report, 10/2019 Crimson Contagion planning exercise International Security Program)
- Russia's war against Ukraine**
- (next) **Climate change crisis!**

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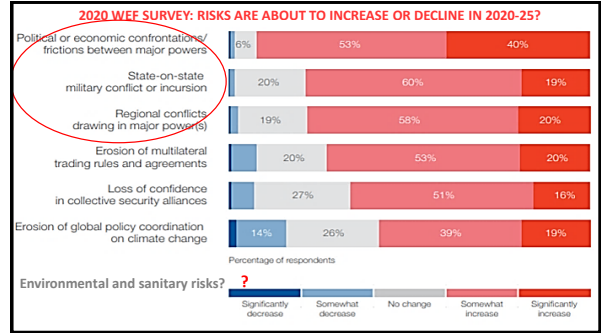
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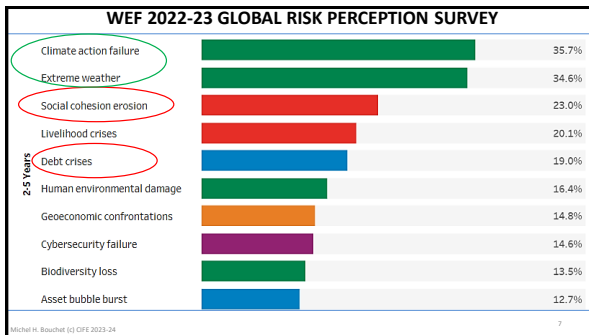
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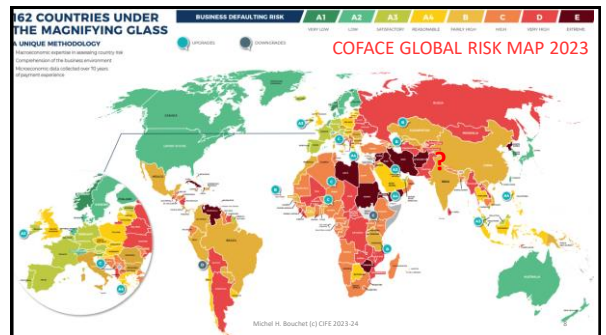
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WHAT IS RISK?

- ▶ Risk stems from all the negative consequences of the Unknown
- "Risk means more things can happen than will happen." Elroy Dimson
- "Risk" derives from the early Italian *risicare* = "to dare" : risk is a **choice** rather than a fate. (Peter L. Bernstein- *Against the Gods: The Remarkable Story of Risk*)

Risk is always related to Uncertainty!

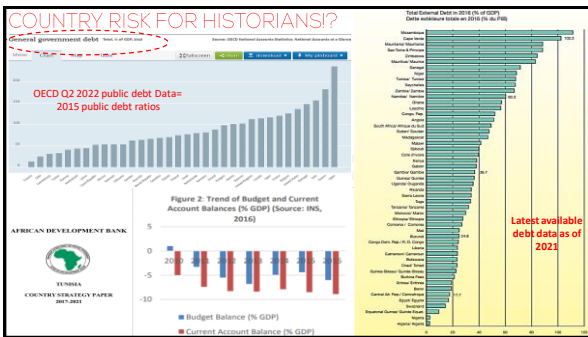
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- ▶ Risk stems from all the uncertainty regarding current or future situations, where information about the situation's outcome is **insufficient, lacking or wrong**
- Information availability = measure of risk (BOP, debt data, income gaps, governance, corruption...)
- Information scarcity = taking action might produce negative and costly consequences (investigation time, transaction cost, delays...)

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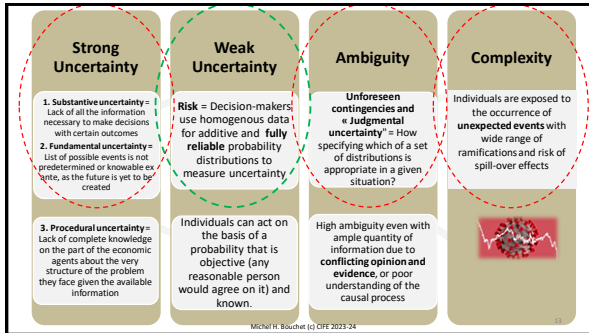
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RISK & UNCERTAINTY

- ▶ Frank Knight: 1921 Risk stems from outcomes that are unknown but can be tackled with probability distribution....
Uncertainty stems from a deficit of information, hence randomness of results
- ▶ Harry Markowitz: 1959: Risk = probability of loss = historical volatility in returns as measured by standard deviation or Beta.
But risk diversification and tolerance also matter!
- ▶ J.M. Keynes: (Treatise on Probability 1921): Non-linear nature of risks and danger of expecting the future as simple projection of the past: Role of animal spirits in volatility spill-over and herd behavior
- ▶ Ulrich Beck: 2010: « Global risk society where current decisions and technological developments trigger long-term global impact » (warming, terrorism, pollution, financial deregulation...)= secular stagnation?

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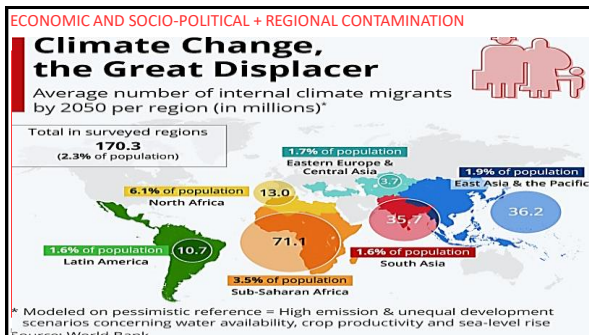
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ILLUSTRATION OF COUNTRY RISK EXAMPLES OF EVENT UNCERTAINTY

Country Risk Event	Strong uncertainty ?	Weak & measurable uncertainty	Ambiguity ?	Complexity ?
Economic events	FDI decision in post-Brexit UK	Exchange rate depreciation	Inflation decrease; growth slowdown	Sharp fall in oil prices Corona Virus
Socio-political events	Revolution, strikes and coup d'état	New market-oriented and pro-business government	High rate of electoral abstention	Upcoming elections; mounting corruption
Financial events	Nationalization of banking system	Interest-rate increase	Over-valuation of tech companies QE & ultra-low rates	External debt default
Spill-over events	Regional crisis contamination	US economic recession	€/USD volatility	Regional competitive devaluations Systemic crisis

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**XIII^e CENTURY:
GRADUAL SHIFT
FROM
CIRCULAR TIME
TO
LINEAR TIME**

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**RISK HAS TO DO WITH UNCERTAINTY REGARDING THE FUTURE,
HENCE THE NEED OF TACKLING FUTURE PROSPECTS!**

« Ancient times » = circular time... until the Middle Age

XV^e century Renaissance = « Modern time » = Merchant time
= linear time of economic & financial transactions +
secular progress

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THE « DISCOVERY » OF RISK

Pascal 1654 **Fermat 1654** **Huygens 1685**

Markowitz 1959 **M. Scholes 1950** **B. Mandelbrot 1990**


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**THE DISCOVERY OF THE
MEASURE OF RISK**

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NICOLAS DE CONDORCET: 1765: PROBABILITY DISTRIBUTION AND STATISTICS (BEGINNING OF BIG DATA?)

Robert Brown: Scottish botanist: in 1827, while examining grains of pollen suspended in water under a microscope, Brown observed minute particles ejected from the pollen grains, **executing a continuous jittery motion**

Jules Regnault (1863): « Le calcul des chances » : random walk model of stock price variations (good/bad speculation)

Louis Bachelier (1900): **stock price forecasting** is impossible due to endless number of influences though it is possible to study **probability distribution of price variations** (sigma) = volatility risk


Alfred Cowles (1933): forecasting stock market prices is impossible (large gap between actual stock prices and professional forecasting)

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LOOKING TOWARD EARLY WARNING SIGNALS OF UPCOMING CRISIS

THE CANARI IN THE COAL MINE?



- ▶ IMF & WB + UN reports?
- ▶ Rating agencies?
- ▶ CDS prices?
- ▶ Stock market volatility
- ▶ Vix Index
- ▶ Spreads and yields
- ▶ Minsky's speculative bubbles and herd-instinct
- ▶ B. Mandelbrot's fractal geometry
- ▶ N. Taleb's Black Swans
- ▶ D. Sornette's Dragon-Kings (extreme events)
- ▶ Capital Flight?

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MEASURING « EXPECTED UNCERTAINTY »?

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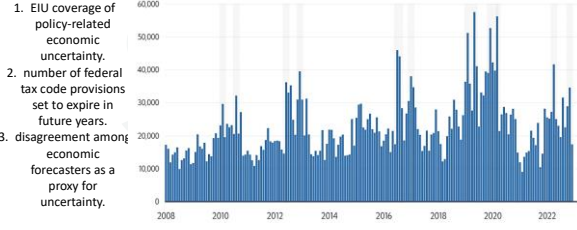
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MEASURING « EXPECTED GLOBAL ECONOMIC UNCERTAINTY » 2007-23

World Uncertainty Index
 Uncertainty surged again following Russia's invasion of Ukraine.
 (Index, GDP-weighted average)

Monthly Index with 3 underlying component:

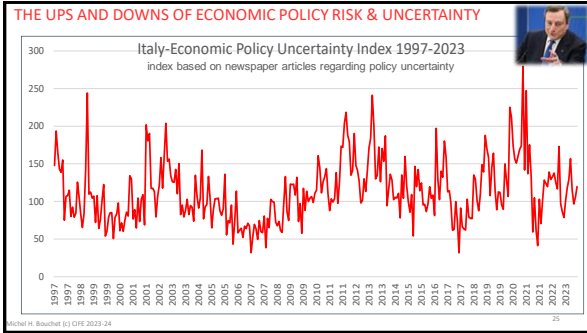
1. EIU coverage of policy-related economic uncertainty.
2. number of federal tax code provisions set to expire in future years.
3. disagreement among economic forecasters as a proxy for uncertainty.



Source= IMF, Stanford, Chicago + Northwestern-Kellogg School universities (143 countries)

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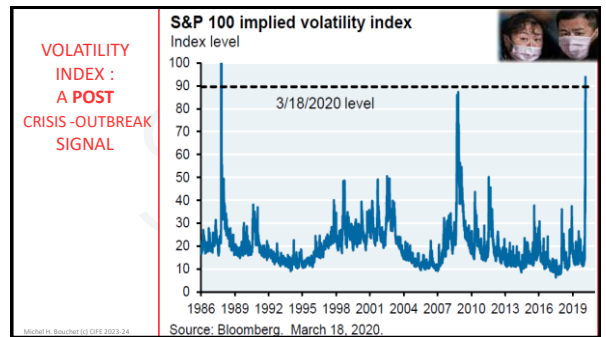
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CHALLENGE? HOW PREDICTING AN ABRUPT SOCIO-POLITICAL CRISIS?

Liquidity indicators

- ▶ Inflation
- ▶ Foreign-exchange reserves
- ▶ Interest rates differential
- ▶ Non-compressible import cover
- ▶ Debt servicing ratio and current account deficit

▶ **Socio-political and behavioral indicators**


- Corruption and institutional weaknesses
- Political turmoil
- Capital flight
- Bank run : number of customers withdraw their deposits simultaneously due to concerns about banking solvency

Solvency and structural indicators

- ▶ Debt levels (Debt/GDP, Debt/X, ST Debt)
- ▶ Worsening terms of trade
- ▶ Productivity's protracted weakness

▶ **Exogenous and global indicators**

- Systemic crisis
- Regional crisis contagion
- Commodity prices
- \$ Exchange rate volatility



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THE COMPLEXITY OF FINANCIAL RISK!

Cost to protect against Turkish debt default abruptly jumps
Five year US spread (basis points)



Source: Reuters

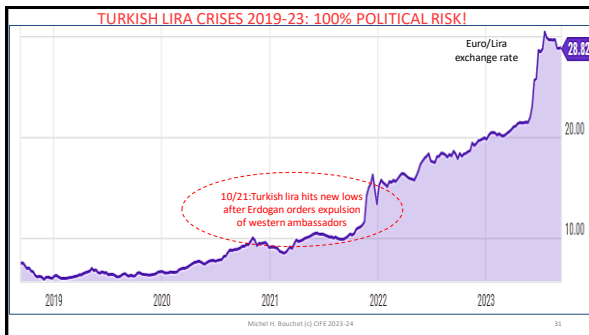
27 Year bonds (USD - INR 0000) (B MARCH - JULY 04)



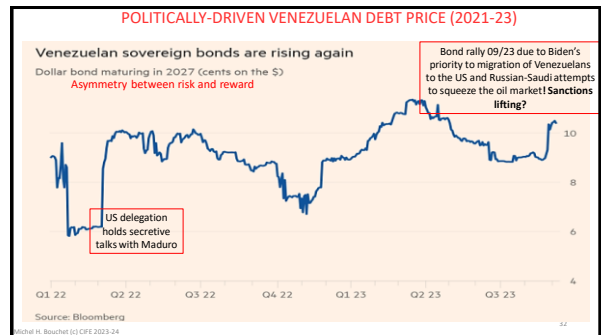


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BUT HOW TACKLING AN « ABNORMAL » RISK?
 LARGE, ABRUPT, AND OUTSIDE THE STANDARD TOOLKIT OF RISK INDICATORS?



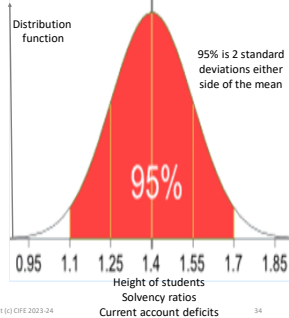
Gradual trend of mounting riskiness	Abrupt turmoil and crisis
<ul style="list-style-type: none"> Liquidity indicators Solvency ratios Ratings and rankings Surveys and polls Behavioral change Institutional weaknesses Growth slowdown <p>= « Gaussian law »</p>	<ul style="list-style-type: none"> War Coup d'état and Revolution Pandemic crisis (Ebola, HIV, Covid-19) Commodity crisis Sharp Exchange rate devaluation Bank run Global virus contamination Debt crisis and default Nationalization & confiscation <p>= « Fat tails and Black swans »</p>

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BELL-SHAPED CURVE
NORMAL
DISTRIBUTION AND FAT
TAILS?

As the number of discrete events increases, the function looks like a normal distribution
 Values < one standard deviation away from the mean account for 68% of the set



Distribution function

95% is 2 standard deviations either side of the mean


0.95 1.1 1.25 1.4 1.55 1.7 1.85

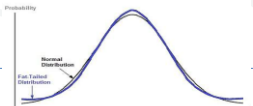
Height of students
 Solvency ratios
 Current account deficits

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WHAT ABOUT RARE BUT CONSEQUENTIAL RISK AND FAT TAILS?

Measuring average height	Measuring growth inequality within and between rich and poor nations?
<p>We select randomly two persons on earth and their total height is ... 4 m What is the most likely correlation between them??</p> 	<p>We select randomly two persons on earth and their combined income is \$40 million: What is the most likely correlation between them?</p> <p>Globally an additional 88 million to 115 million people fell into extreme poverty in 2020, a number that could rise to 150 million in 2021-22.</p>



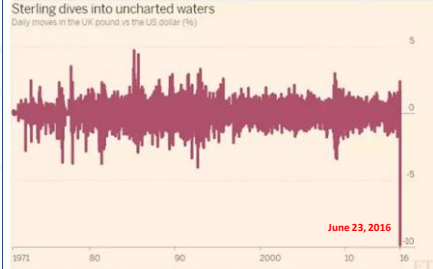
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FATTAILS:
OUTSIDE
THE
COMFORT
OF THE
« BELL
CURVE »

Good morning Britain. This is what happened to your currency while you were asleep.

Sterling dives into uncharted waters
 Daily moves in the UK pound vs the US dollar (%)



June 23, 2016

Source: FT John Authers
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BLACK SWANS AND DRAGON KINGS

- **Nassim Taleb's Black Swans:** Major catastrophes are just events that started small and did not stop growing to develop into extreme sizes. These events are **unpredictable!** Black Swans are quantified by heavy-tailed distributions of event sizes ("fat tails" in Gaussian distributions). These outliers come from a small number of observations with very large impact!



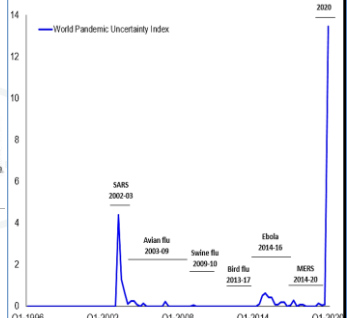
- **Sornette's Dragon Kings:** Very large in impact and born out of unique origins: non-linear systems. These **extreme events** are generated by herd-instinct, feedbacks, and unsustainable super-exponential acceleration before collapse. DKs are beyond the extrapolation of the fat tail distribution. Their occurrences **can be diagnosed ex-ante**, bringing back responsibility and accountability.

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THE WORLD PANDEMIC UNCERTAINTY INDEX 1996-2020

Note: The WPU is the number of times that a word out of 100,000 in a given EU country report mentions the word uncertainty near a word related to pandemics or epidemics. A higher number means higher global uncertainty around pandemics/epidemics and vice-versa. The numbers for 2020 are based on the reports for March or the latest available. The WPU is a sub-index of the World Uncertainty Index. (<https://www.uncertaintyindex.com/>)



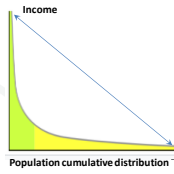
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POWER LAWS AND EXTREME RISKS?

Power law probability distributions = Functional relationship between 2 quantities, where a relative change in one quantity results in a proportional relative change in the other quantity, independent of the initial size of those quantities: one quantity varies as a power of another.

- Considering the area of a square in terms of the length of its side, if the length is doubled, the area is multiplied by a factor of four!
- Car exhaust is distributed according to a power-law among cars : very few cars contribute to most contamination
- Wealth gap and Pareto distribution: The net worth of Americans is distributed according to a power law with an exponent of 2 (the average income hides fat-tails!)
- Power-law distributions are plotted on doubly logarithmic axes, which emphasizes the upper tail region ("extreme events")
- Log-log plot and power-law graph of cumulative distribution of ranking of popularity: right= long tail and left= the few that dominate, also known as the 80-20 rule

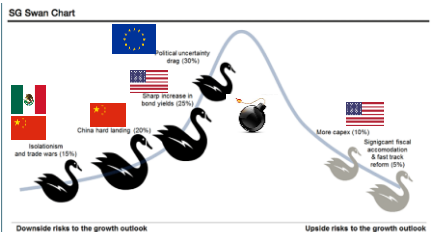


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HOW DOES A GLOBAL BANK LIKE SOCIETE GENERALE MEASURE THE RISK OF « BLACK SWANS »?

SG Swan Chart



The y-axis gives an indication of how probable we consider a risk factor to be. The size of the swans gives an indication of how important the impact of that event materializing would be in terms of its upside or downside shock to the outlook.
Source: SG Credit Asset Research/Economics

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CONCLUSION

▶ **Transforming information into economic intelligence = Best risk mitigation strategy!**

SRK

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**Hello CIFE students! HELP!
I need a quick risk assessment of Italy vs Spain!**

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COFACE + UNDP + TI + WORLD BANK= BETTER OFF IN ITALY OR IN SPAIN?

ITALY	SPAIN
▶ GDP Per capita ppp= \$43000	▶ GDP Per capita ppp=\$41000
▶ HDI= 29	▶ HDI= 25
▶ Life expectancy f= 85,5	▶ Life expectancy f= 86
▶ Infant mortality= 3/1000	▶ Infant mortality= 2,5/1000
▶ Gender inequality: 0,07	▶ Gender inequality: 0,07
▶ Doing Business= 58/190	▶ Doing Business= 30/190
▶ Corruption = 41/180 ↑	▶ Corruption = 35/180 ↓
▶ Debt/GDP = 140%	▶ Debt/GDP 2023 = 111%
▶ Unemployment = 8%	▶ Unemployment= 13%
▶ Budget Deficit 2023: -5,3%	▶ Budget Deficit = -4,1%

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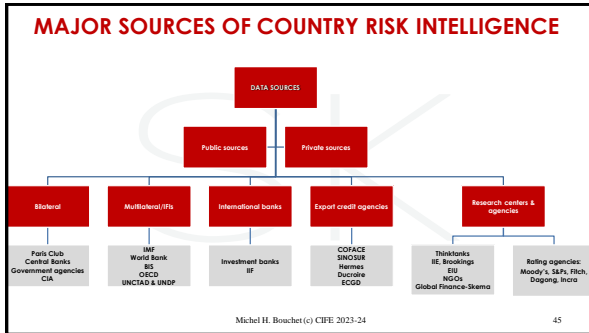
COUNTRY RISK ASSESSMENT IN AN AGE OF GLOBALIZATION?

Reliable and updated information
= Economic intelligence

➔ **Robust risk analysis**

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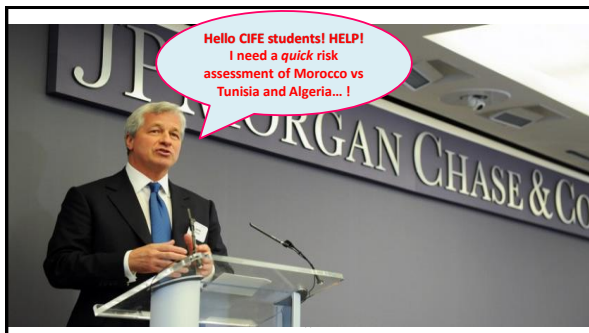
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INFORMATION SOURCES & ANALYSIS

IMF, World Bank, IFC & MIGA
UNCTAD & UNDP
Fed Reserve Bk of St Louis
BIS, OECD, EBRD, EIB
Coface, Euler-Hermes
Moody's, S&P, Fitch, Dagong
Euromoney, Institutional Investor
CIA & US State Dept, ICRG
Transparency International
Hiscox, AON, Control Group
DEFI www.developingfinance.org

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COFACE + UNDP + TI + WORLD BANK= BETTER OFF IN TUNISIA, MOROCCO OR ALGERIA?

TUNISIA	ALGERIA	MOROCCO
▶ GDP Per capita = \$10700	▶ GDP Per capita=\$11800	▶ GDP per capita ppp= \$8300
▶ HDI= 97	▶ HDI= 91	▶ HDI = 123
▶ Life expectancy f = 78	▶ Life expectancy f= 75	▶ Life expectancy= 76
▶ Infant mortality= 13/1000	▶ Infant mortality= 22/1000	▶ Gender inequality= 0,49
▶ Gender inequality: 0,28	▶ Gender inequality: 0,43	▶ Infant mortality= 23,7/1000
▶ Doing Business= 78/190	▶ Doing Business= 157/190	▶ Doing Business = 53/190
▶ CPI Corruption = 85/180	▶ CPI Corruption = 116/180	▶ CPI corruption= 94/180
▶ MDP Index: 2%	▶ MDP Index: 4%	▶ MDP Index: 11%

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