



# The impact of COVID on financial markets

**Silvia Muzzioli**, Luca Gambarelli

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lesson in the course Financial modelling Applications



# Volatility indices



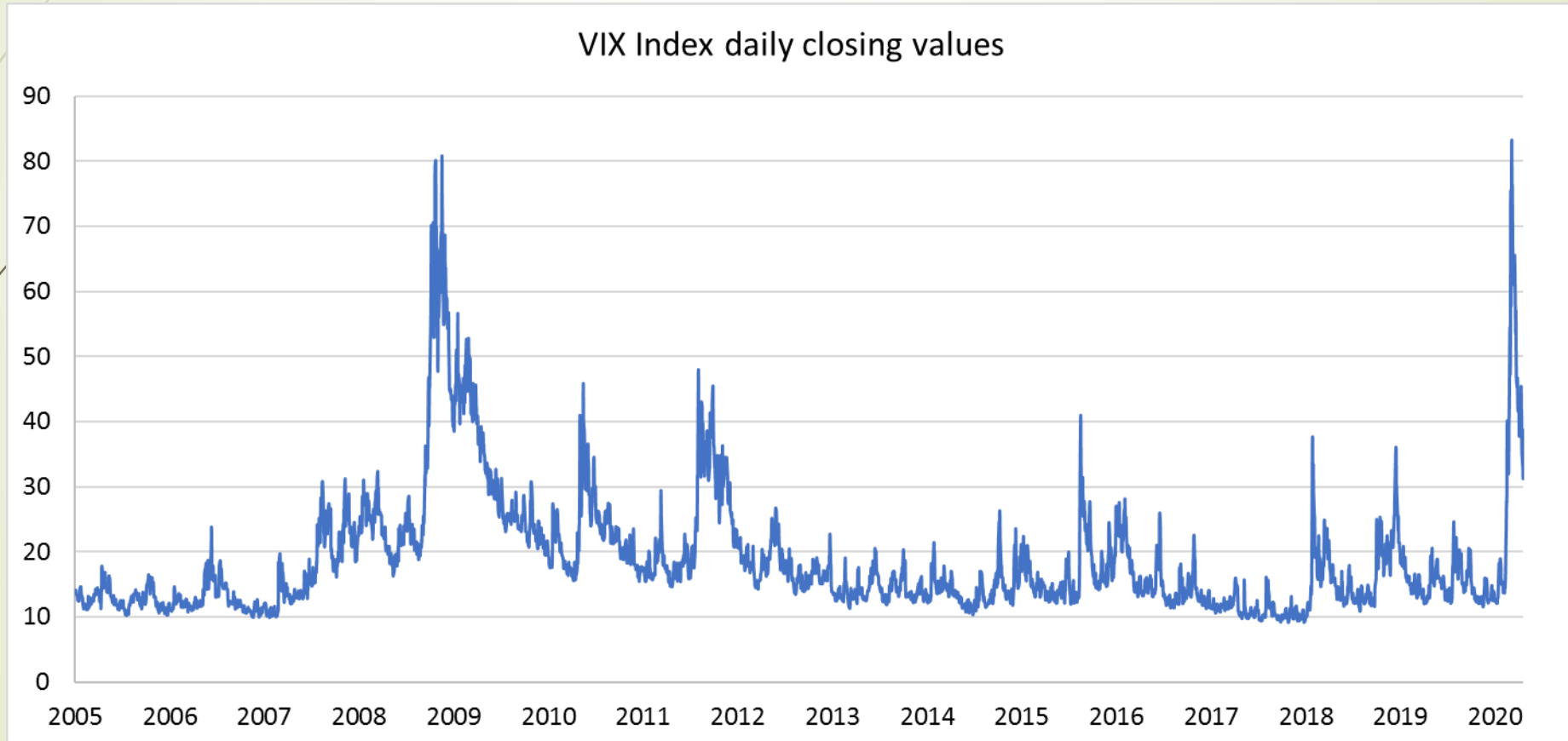
- ▶ The Cboe Volatility Index® (VIX® Index) has been introduced in 1993 by Cboe Global Markets, Incorporated® (Cboe®) to measure the market's expectation of 30-day implied volatility of the S&P 100® index obtained from option prices.
- ▶ Ten years later in 2003, the VIX volatility index calculation methodology has been updated to reflect a new way to measure expected volatility.
- ▶ It currently measures the implied volatility of the S&P 500 index options and the market's expectation of stock market volatility over the next 30-day period.
- ▶ On March 24, 2004, the Cboe introduced the first exchange-traded VIX futures contract. Given the negative correlation between the volatility index and stock market returns, the VIX can be used as a diversification opportunity in a portfolio.

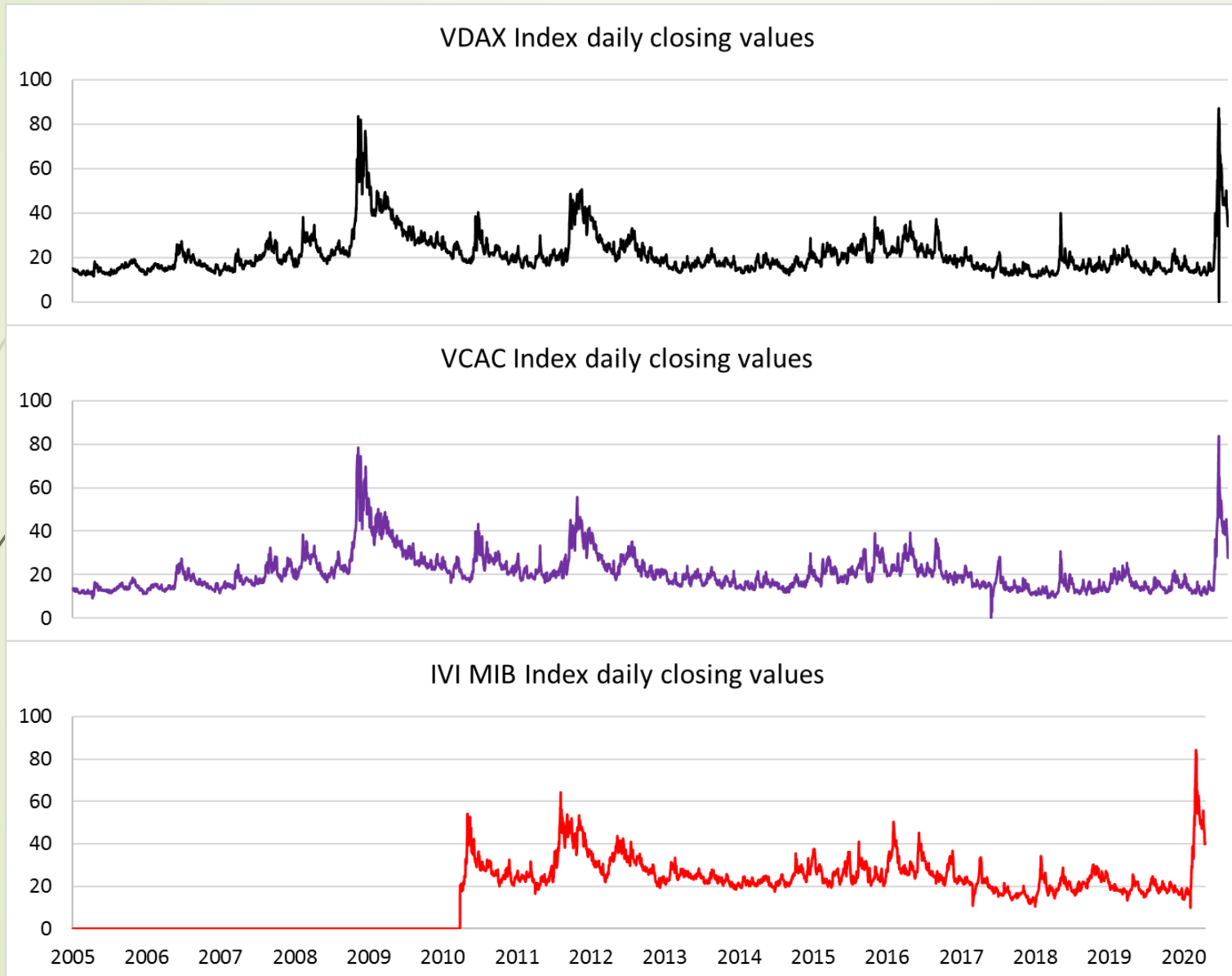


# Volatility indexes (geographic diversification)

- **VDAX** volatility index for the DAX index, representative of the 30 largest companies of the German stock market (VDAX introduced 1994, changed 20 April 2005)
- **VSTOXX** volatility index for the Dow Jones EURO STOXX 50, a blue chips index of the top 50 stocks of the Euro zone (20 April 2005)
- **VCAC** Volatility Index for the CAC40 French market index (3 September 2007)
- **VFTSE** Volatility index for the FTSE 100 British market index (12 June 2008).
- **VNIKKEI** stock average volatility index on the NIKKEI 225 stock index (November 2010) end of day. Replaces old index computed from June 1989.
- **IVI MIB** Italian volatility index 30,60,90,180,360 (launched 18 February 2013 (computed from 1 April 2010)
- Other volatility indices: **VAEX** (Dutch market), **VSMI** (Swiss market), **VBEL** (Belgian market), **SAVI** South Africa, **INDIA VIX** (Indian market), **S&P/TSX 60 VIX** (Canadian market), **S&P/ASX 200 VIX** (Australian market), **RTSVX** (Russian market), **VHSI** (Hong Kong market), etc.

The VIX volatility index closed at 82.69 on March 16, 2020 : a record high

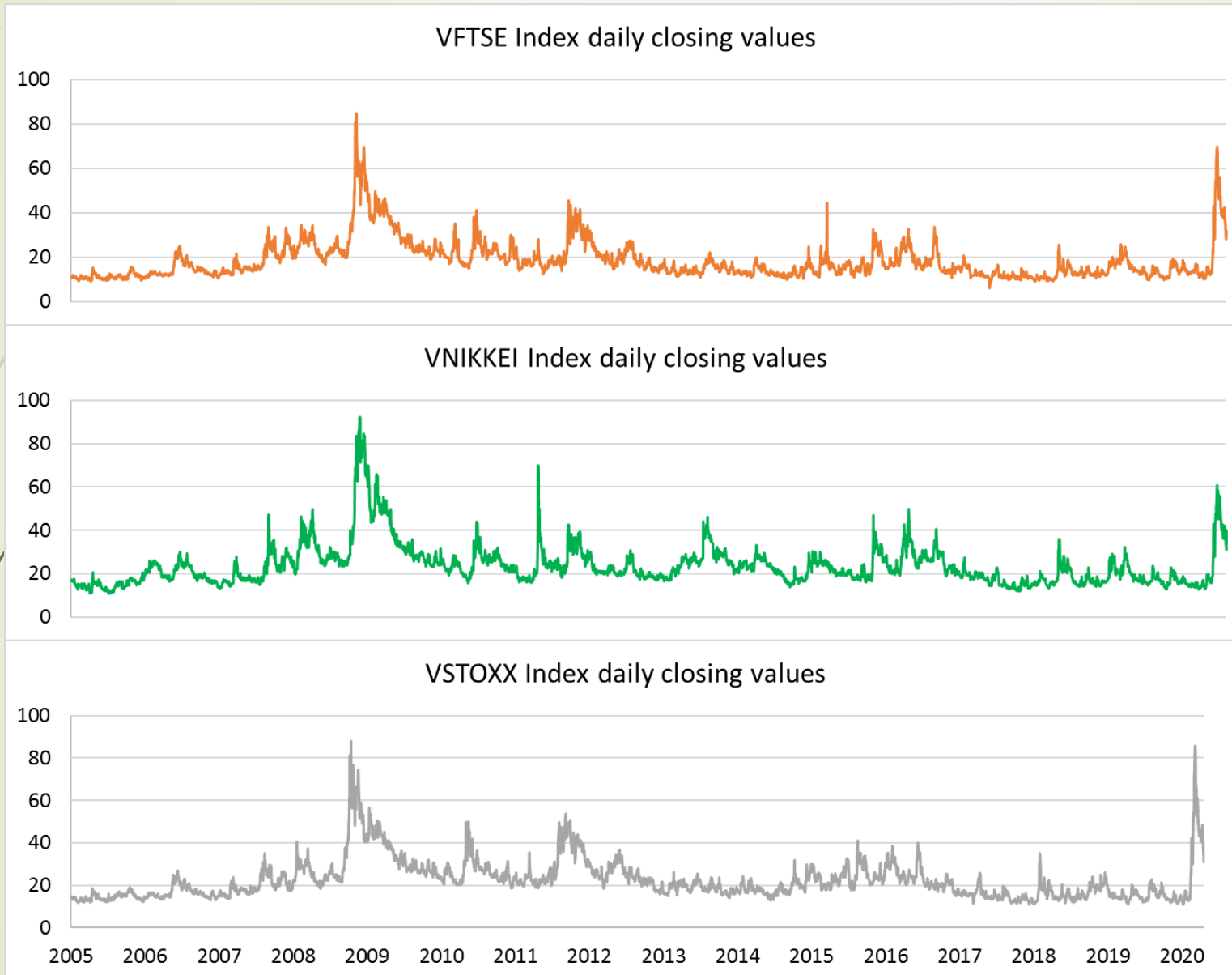




- Other records: VDAX, VCAC and IVI MIB\* volatility indices spiked on March 16, 2020 (resp. 86.01, 83.58 and 83.73)

They signal a very high level of turbulence in the markets.

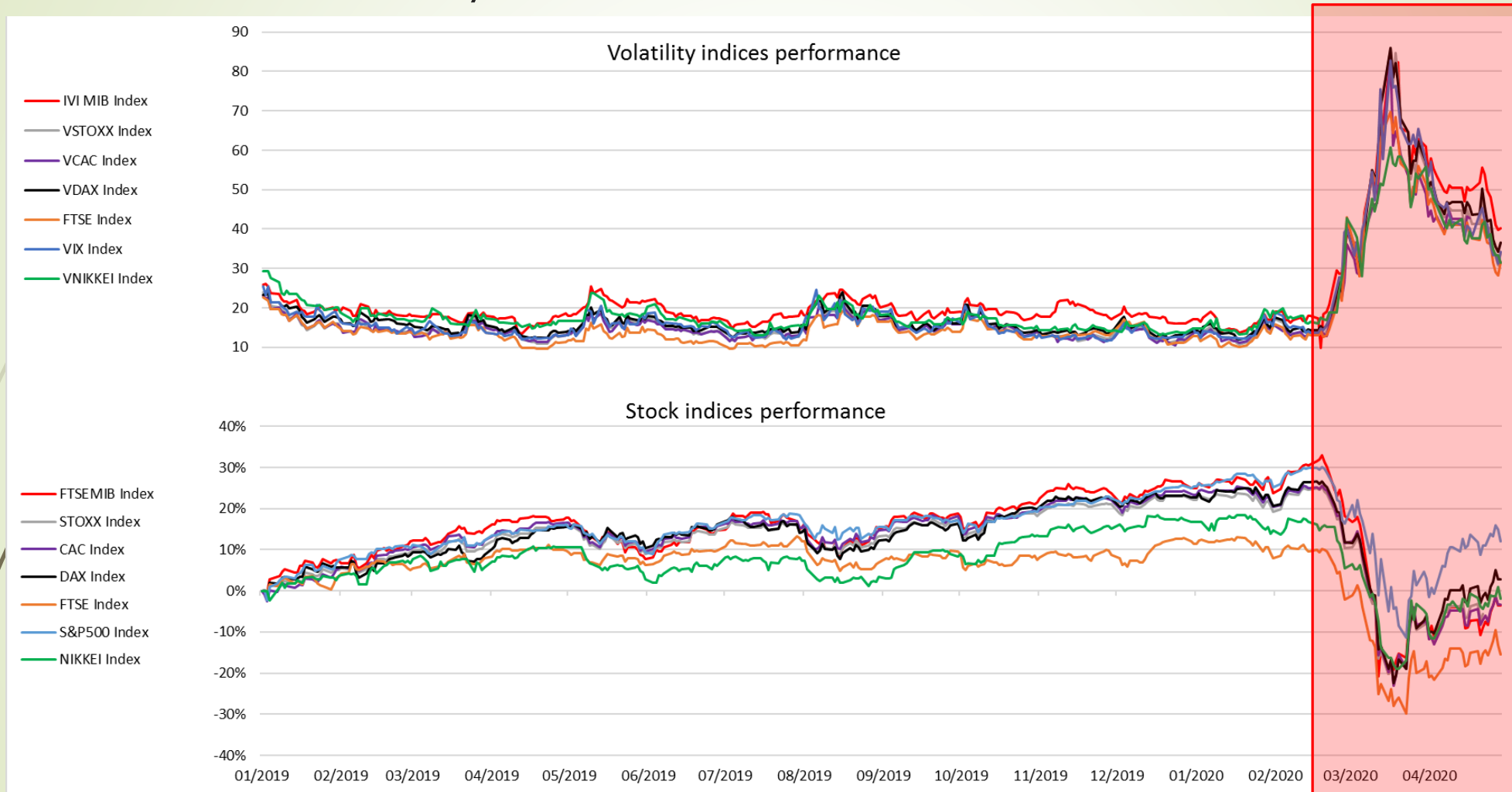
\* IVI MIB volatility index is computed from 2010



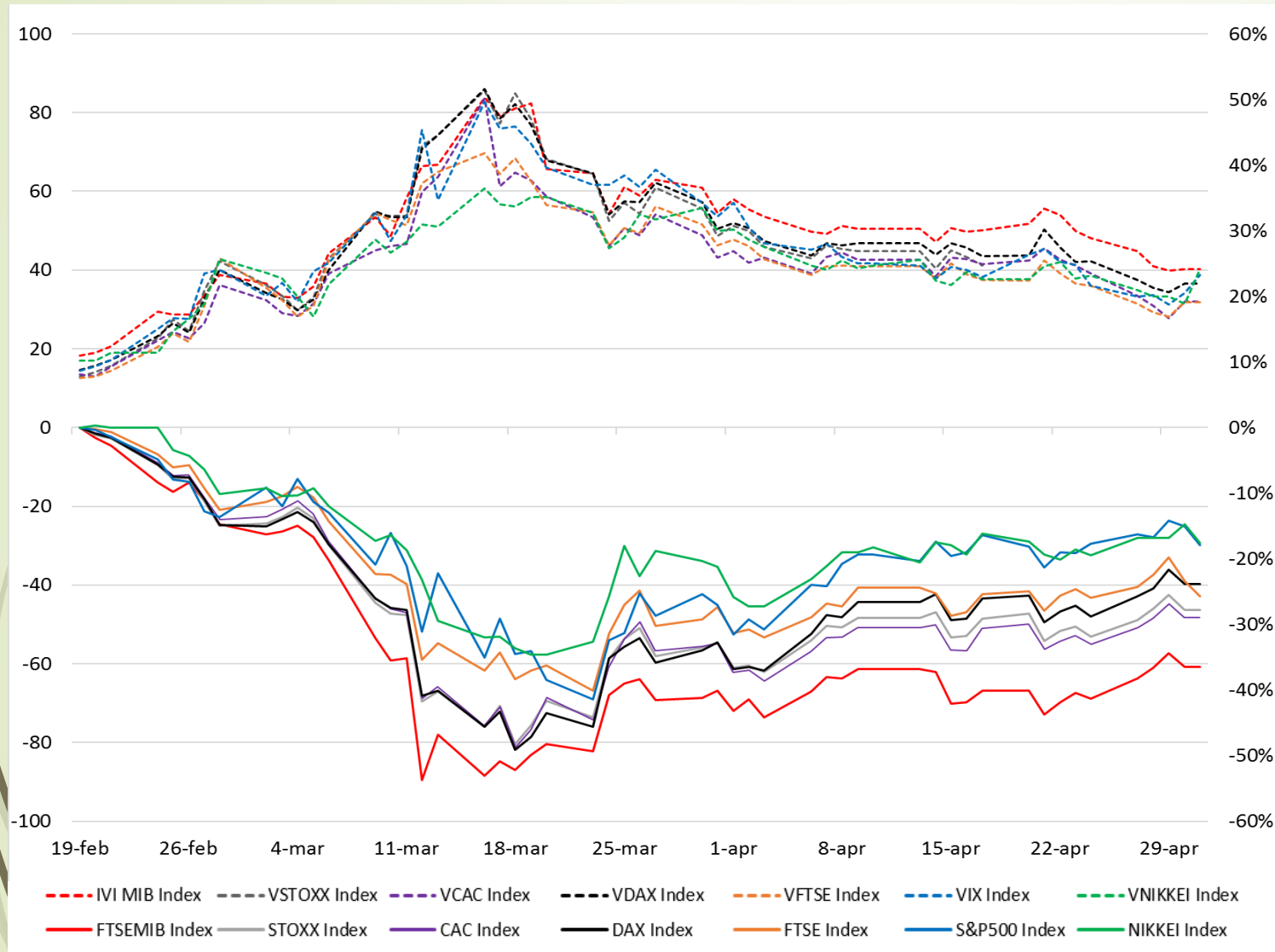
- VNIKKEI, VFTSE and VSTOXX volatility indices did not reach the previous highs (recorded during 2008-2009 financial crisis).



Volatility was quite low before February 2020, then dramatically increased and indices went down



# Volatility and stock indices during COVID-19 outbreak

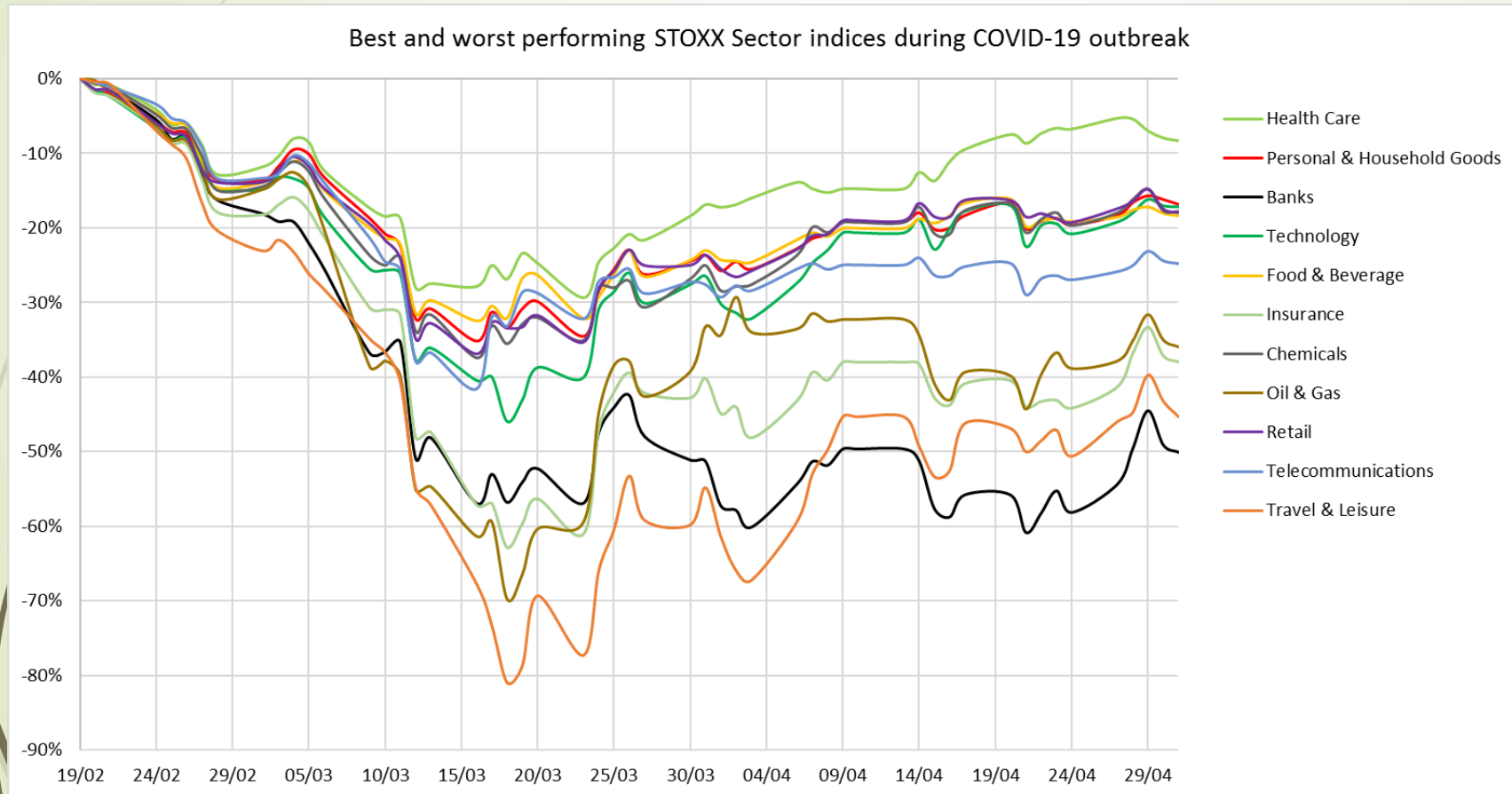


## COVID -19 outbreak timeline:

- 19 - feb: first Italian tested positive in Codogno;
- 3 - mar: Fed cuts interest rates by 50 basis points to combat coronavirus outbreak;
- 11 - mar: WHO Director declares the global COVID-19 outbreak a pandemic;
- 12 - mar: BCE announced additional LTROs, Lagarde 'not here to close spreads' comment;
- 15 - mar: Fed started QE program (increase its holdings of Treasury securities by at least \$500bn and its holdings of mortgage-backed securities by at least \$200bn);
- 18 - mar: BCE increased asset purchases by €750 bn through 2020;
- 19 - mar: BOE increased asset purchases by £200 bn;
- 23 - mar: FED announced unlimited QE;
- 31 - mar: Trump announced \$350 bn in loans to small businesses;
- 2 - apr: President of the EU Commission Von Der Leyen presented a new set of EU measures to preserve Europe's skilled workforce;
- 7 - apr: Trump ask for additional \$250 bn for small businesses.
- 9 - apr: FED takes additional actions to provide up to \$2.3 bn in loans to support the economy



# Focus on the EU: not all stocks has been penalized in the same way



- Banking is the sector that suffered most. They reflect the economy collapse risk.
- Also Oil & Gas, Insurance, and Travel & Leisure suffered major declines during COVID-19 outbreak.
- Other sectors such as Health Care reported slightly negative performance during the period.
- Losses were small for Personal & Household Goods, Technology, Food & Beverage, Chemicals, Retail, and Telecommunications sectors.

## 2008 vs 2020 market crash: volatility indices spikes

		<b>VIX</b>	<b>VNIKKEI</b>	<b>VFTSE</b>	<b>VSTOXX</b>	<b>VDAX</b>	<b>VCAC</b>	<b>IVI MIB</b>
2008 crisis	Range:	31.70-80.86	28.42-92.03	30.99-84.82	30.59-87.51	29.03-83.23	31.74-78.05	-
	Time:	67 days	46 days	31 days	31 days	31 days	31 days	-
2020 crisis	Range:	14.38-82.69	17.04-60.67	14.02-69.73	12.88-85.62	14.64-86.01	13.52-83.58	18.32-83.76
	Time:	26 days	26 days	26 days	26 days	26 days	26 days	26 days

- During the 2008 collapse, the volatility peak came after 30-70 calendar days from the Lehman Brothers crack (September 15, 2008), depending on the market under investigation. On the other hand, during the 2020 market crash, the volatility peak was reached in just 26 days (from February 19, to March 16).
- During the 2020 market crash, the volatility peak has been recorded in the same day (March 16) for all the markets under investigation, highlighting an increased level of correlation between the stock markets and the exogeneity of the crisis.

# 2008 vs 2020 market crash: stock indices collapse

		<b>S&amp;P 500</b>	<b>NIKKEI</b>	<b>FTSE</b>	<b>STOXX</b>	<b>DAX</b>	<b>CAC</b>	<b>FTSE MIB</b>
2008 Crisis	Variation:	-50.89%	-53.37%	-35.95%	-41.44%	-41.25%	-40.79%	-45.68%
	Time:	66 days	42 days	67 days	67 days	67 days	67 days	81 days
2020 Crisis	Variation:	-41.44%	-34.62%	-40.09%	-44.15%	-45.58%	-44.55%	-41.44%
	Time:	34 days	33 days	33 days	33 days	33 days	33 days	33 days

- During the 2008 collapse, each stock market reaches its lowest value with a different timing.
- On the other hand, during the 2020 market crash all the stock indices under investigation collapsed in about 30 days.
- The use of high frequency and automated trading may have contributed to the rapid and simultaneous collapse that characterized all stock markets.

## 2008 vs 2020 market crash: stock markets rebound one month after

		<b>S&amp;P 500</b>	<b>NIKKEI</b>	<b>FTSE</b>	<b>STOXX</b>	<b>DAX</b>	<b>CAC</b>	<b>FTSE MIB</b>
2008 crisis	Time:	Nov, 20 – Dec, 19	Oct, 28 – Nov, 27	Nov, 21 – Dec, 20	Nov, 21 – Dec, 20	Nov, 21 – Dec, 20	Nov, 21 – Dec, 20	Dec, 5 – Jan, 4
	Rebound:	16.55%	15.61%	12.56%	12.09%	12.92%	11.30%	10.48%
2020 crisis	Time:	Mar, 23 – Apr, 22	Mar, 23 – Apr, 22	Mar, 23 – Apr, 22	Mar, 23 – Apr, 22	Mar, 23 – Apr, 22	Mar, 23 – Apr, 22	Mar, 23 – Apr, 22
	Rebound:	22.41%	12.51%	14.46%	13.15%	17.52%	11.96%	7.46%

- ▶ As for the decline, also the market rebound has been faster and more pronounced for the 2020 market crash than for the 2008 one.
- ▶ The unprecedented behavior of central banks around the world and the amount of fiscal stimulus may have contributed to the recovery of financial markets.
- ▶ While most volatility indices have returned to normal levels, the IVI MIB has shown different behavior, suggesting that the investment on the Italian market is still characterized by a high level of risk.
- ▶ This could be in part explained by the composition of IVI MIB: Oil & Gas and Banks represent around 30% of the total FTSE MIB capitalization during the crisis period.



# TWO POSSIBLE FUTURE SCENARIOS

## **First Scenario(more optimistic):**

- Abrupt Decline of COVID-19;
- V-shape recovery
- Decrease in volatility

## **Second Scenario(more pessimistic):**

- Protraction of the Epidemic;
- Markets remain exposed to downward shifts
- Volatility remains high