



Financial regulation in the age of innovation: A glimpse into the future

Alexey Lobanov, Ph. D., FRM

Deputy Director

Banking Regulation Department

Bank of Russia

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The views and opinions expressed herein are those of the author and do not necessarily reflect the official position of the Bank of Russia

Outline

1. Are current regulatory trends sustainable?
2. Paradigm: dialectics and dimensions of financial regulation
3. Technology: delegated risk reporting?
4. Foresight: financial regulation in 2025
5. Q & A

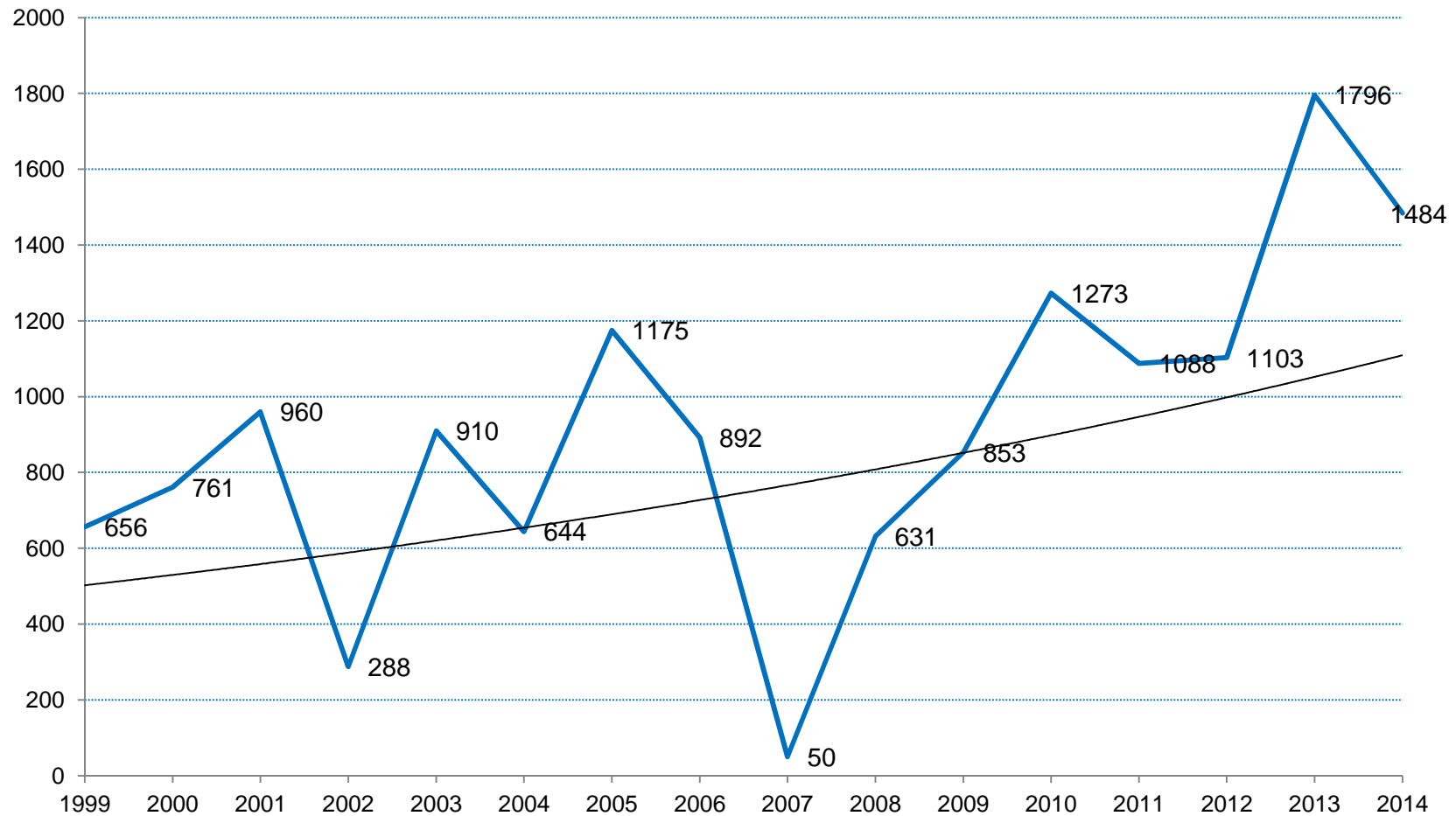
As a foreword ...



Are current regulatory trends sustainable?



Total number of pages of publications by the Basel Committee on Banking Supervision

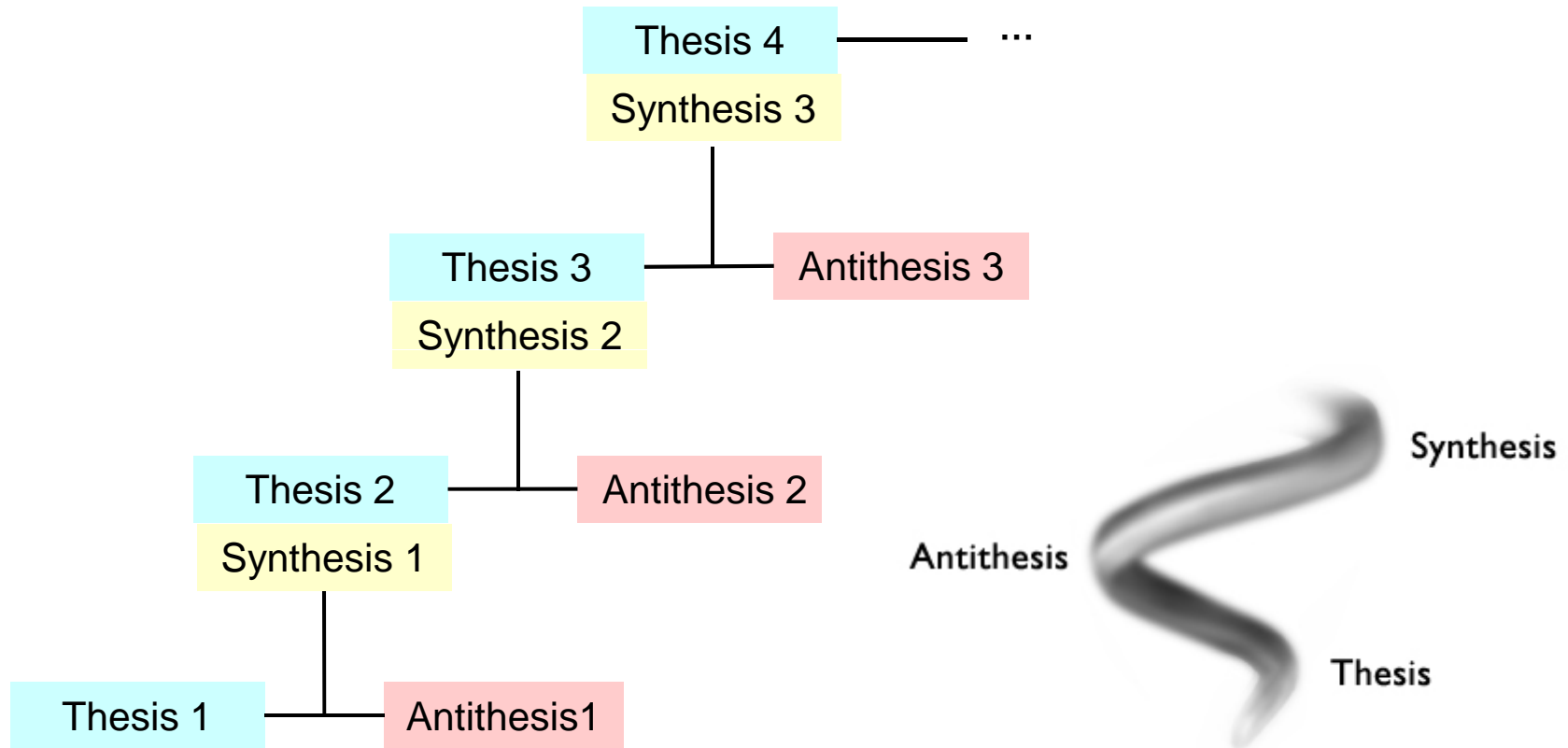


Source: Zeyn Adam, Chair of the ARB Committee on Basel II and risk management standards, 2012; author's calculations

Paradigm: Quo vadis?



Hegel's dialectics in action

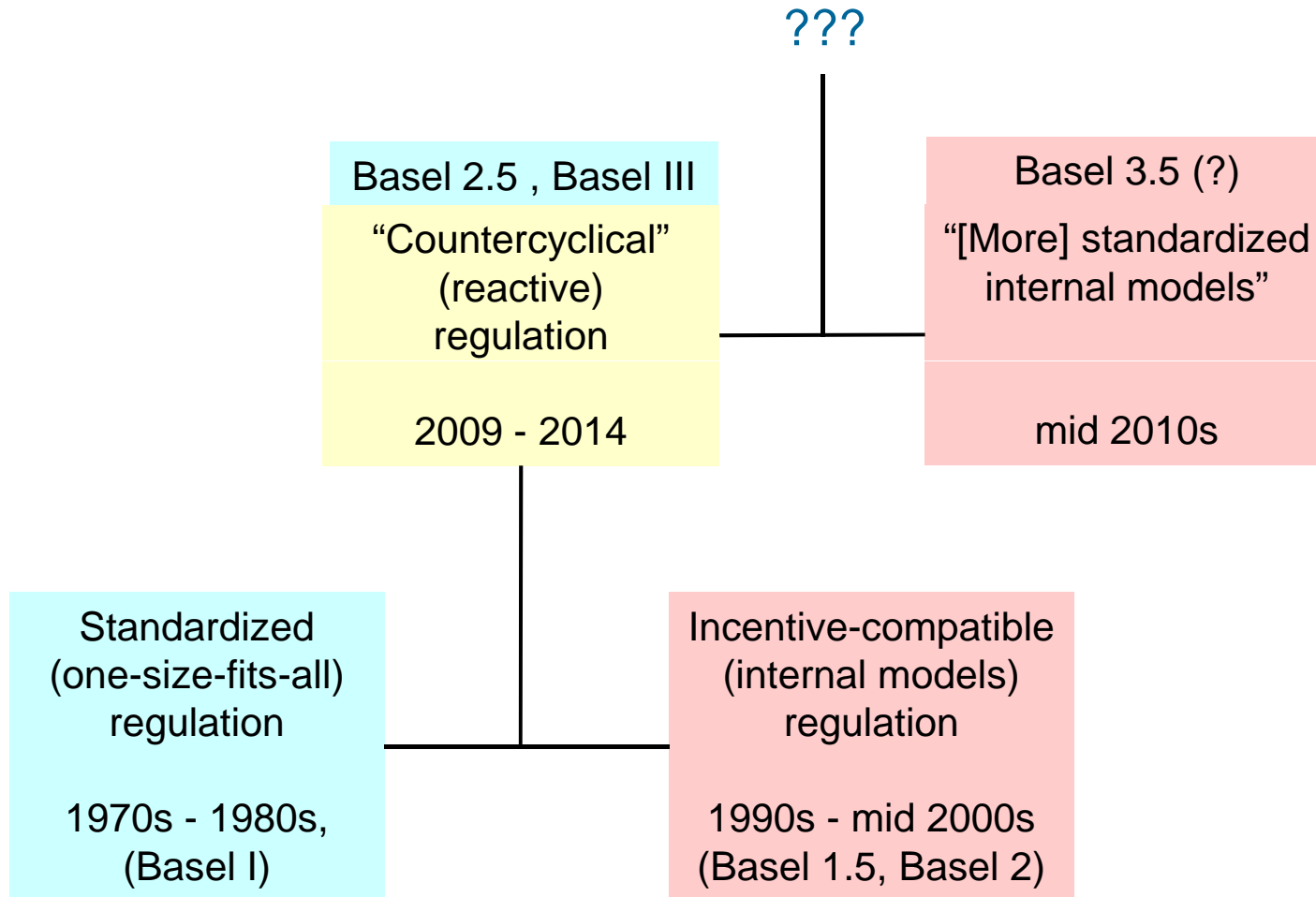


Can this technique be applied to forecasting the future of regulation?

Paradigm: Quo vadis?



Dialectics of regulatory evolution: one-dimensional case



Paradigm: Quo vadis?



Dimensions of regulations

- § Rules-based regulation vs principle-based regulation
- § “Command” regulation vs incentive-compatible (contract-based) regulation
- § Regulatory comparability* (“one-size-fits-all”) vs regulatory diversity
- § Simple regulation* vs complex regulation
- § Standardized regulation vs risk-sensitive regulation
- § Statutory regulation vs self-regulation
- § More regulation vs less regulation ...

Regulation evolves as a multi-dimensional tree with some overlapping nodes

* Current focus of the Basel Committee on Banking Supervision



Dimensions of regulations: examples

- § Rules-based regulation is not necessarily simple! (e.g. [Basel III \(BCBS 2011, 2013\)](#))
- § Principle-based regulation is not necessarily simple! (e.g. Internal Models Approach to market risk ([BCBS 1996](#)), IRB approach & AMA in [Basel II \(BCBS 2006\)](#), [Solvency II \(European Commission 2015\)](#))
- § Risk-sensitive regulation is not necessarily incentive-compatible! (e.g. revised Internal Models Approach ([BCBS 2013](#)))
- § [The most] incentive-compatible regulation is not necessarily complex! (e.g. Pre-commitment Approach to market risk ([Kupiec and O'Brien 1997](#)))
- § Standardized regulation is not necessarily simple! (e.g. revised Standardized Approaches to counterparty credit risk or securitization ([BCBS 2014b, 2014c](#)))
- § Standardized regulation is not necessarily insensitive to risk! (e.g. revised Standardized Approach to market risk ([BCBS 2014a](#)))

Paradigm: Quo vadis?



Dimensions of regulations: a case of emerging market risk revision

Is/does the revised sensitivity-based Standardized Approaches to market risk (BCBS 2014a) ...

rules-based	..	or	principle-based?	..
“command”	..	or	incentive-compatible?	..
simple	..	or	complex?	..
insensitive to risk	..	or	risk-sensitive?	..
ensure comparability of capital levels?	..	or	ensure variety of capital levels?	..
more computationally burdensome*	..	or	less computationally burdensome?	..
raise capital requirements*	..	or	lower capital requirements?	..

* Compared to capital requirements for market risk under the standardized approach in Basel 2.5

Paradigm: Quo vadis?



Dimensions of regulations: a case of emerging market risk revision

Is/does the revised sensitivity-based Standardized Approaches to market risk (BCBS 2014a) ...

rules-based	Yes	or	principle-based?	No
“command”	Yes	or	incentive-compatible?	No
simple	No	or	complex?	Yes!
insensitive to risk	No	or	risk-sensitive?	Yes?
ensure comparability of capital levels?	No	or	ensure variety of capital levels?	Yes?
more computationally burdensome*	Yes!!!	or	less computationally burdensome?	No
raise capital requirements*	Yes?***	or	lower capital requirements?	No

* Compared to capital requirements for market risk under the standardized approach in Basel 2.5

** Author's estimation based on the design of the approach

Paradigm: Quo vadis?



Computational complexity: A case of emerging market risk revision

Proposed revision to Standardized Approach to market risk (BCBS 2014a) includes 439 different parameters!

Risk class	Risk weights and LGDs	Correlations	Matrices*	Total
General interest rate risk	13	111	2	124
Credit spread risk	36	83	1	119
Equity risk	15	70	1	85
Commodity risk	13	78	1	85
FX risk	2	7	2	9
Default risk (except securitized instruments)	11	0	0	11

* Not counted in the total number

Source: Basel Committee (2014a)



Computational complexity: a new challenge

For regulators: curse of dimensionality!

- L Calibration issues due to interplay of numerous variables
- L As a result, new regulations introduced based on scarce empirical data
 - G Fundamental review of the trading book tested by Basel Committee in only one hypothetical portfolio exercise and two full quantitative impact studies (QIS) compared to 4+1 QIS for Basel II
- L Supervision issues: costly verification of banks' reporting data
- L Comparability issues: significant variability in results even on the test portfolios

For banks: prohibitive implementation cost!

- L "Doubling" data and IT environment used only for regulatory calculation
- L Increased cost of compliance with little gain for internal risk management

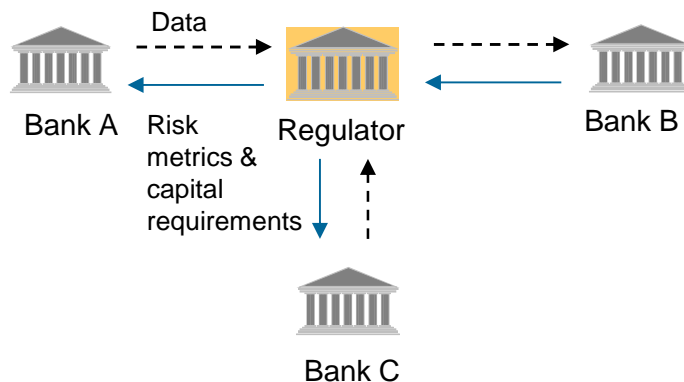
Emerging regulatory paradigm can hardly be implemented under current institutional environment and risk reporting technology!

Technology: delegated risk reporting



Regulatory “internal models”: delegated risk calculation & monitoring?

Type A (centralized): Regulatory risk and reporting engine at regulator



---> Book-level real-time data (operations, open positions, etc.)

—> Regulatory reports and capital adequacy requirements

Pros:

- C Very low cost for market players
- C No data confidentiality issues
- C Richest data available for regulator

Cons:

- D Possible mistrust of market players to regulator’s “black box”
- D High requirements for computational power at the regulator’s side

Examples:

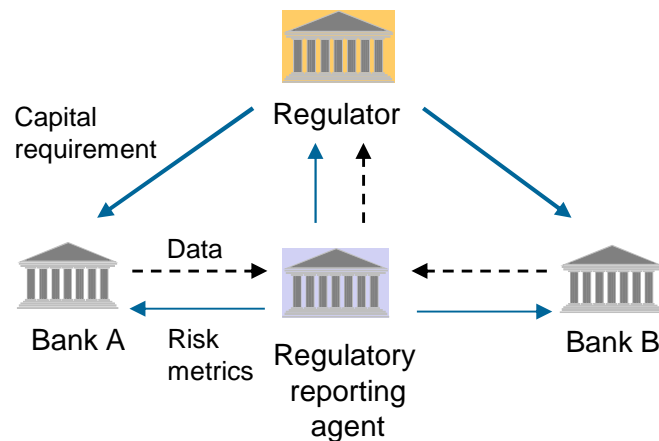
- ü Top-down stress testing of EU banks by EBA
- ü Quarterly calculation of Basel III leverage ratio by Bank of Russia since August 2013

Technology: delegated risk reporting



Regulatory “internal models”: delegated risk calculation & monitoring?

Type B (distributed): Regulatory risk and reporting engine at designated agent



---> Book-level real-time data (operations, open positions, etc.)

—> Regulatory risk reporting and capital adequacy requirements

Pros:

- C Very low cost for regulator
- C Reporting agent’s calculations can be checked and trusted by market players

Cons:

- D Data confidentiality issues
- D High requirements for computational power at reporting agent’s side

Example:

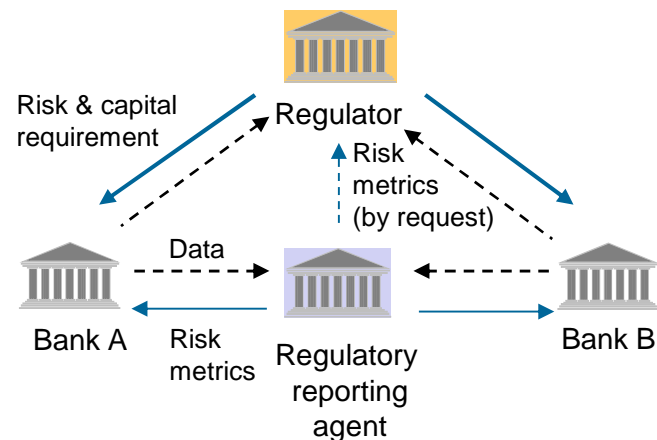
- ü Calculation of initial and variation margin by central counterparty in OTC derivative markets

Technology: delegated risk reporting



Regulatory “internal models”: delegated risk calculation & monitoring?

Type C (hybrid): Regulatory risk engines at both the regulator and designated agent



---> Book-level
real-time data
(operations, open
positions, etc.)

—> Regulatory risk
reporting and
capital adequacy
requirements

Pros:

- C Very low cost for market players
- C Higher reliability of calculations
- C Safer data storage at both sites
- C “Second opinion” on regulatory risk reports
- C Market discipline

Cons:

- D Data confidentiality issues
- D High requirements for computational power at both regulator’s and reporting agent’s side

In all three cases, high-performance computations are required

Technology: delegated risk reporting



Examples of high-performance computations in finance

Business-driven problems

- ü Derivative pricing and dynamic hedging in real time
- ü Risk measurement: VaR, Expected Shortfall, and higher moments risk measures

Real-time selection of counterparties:

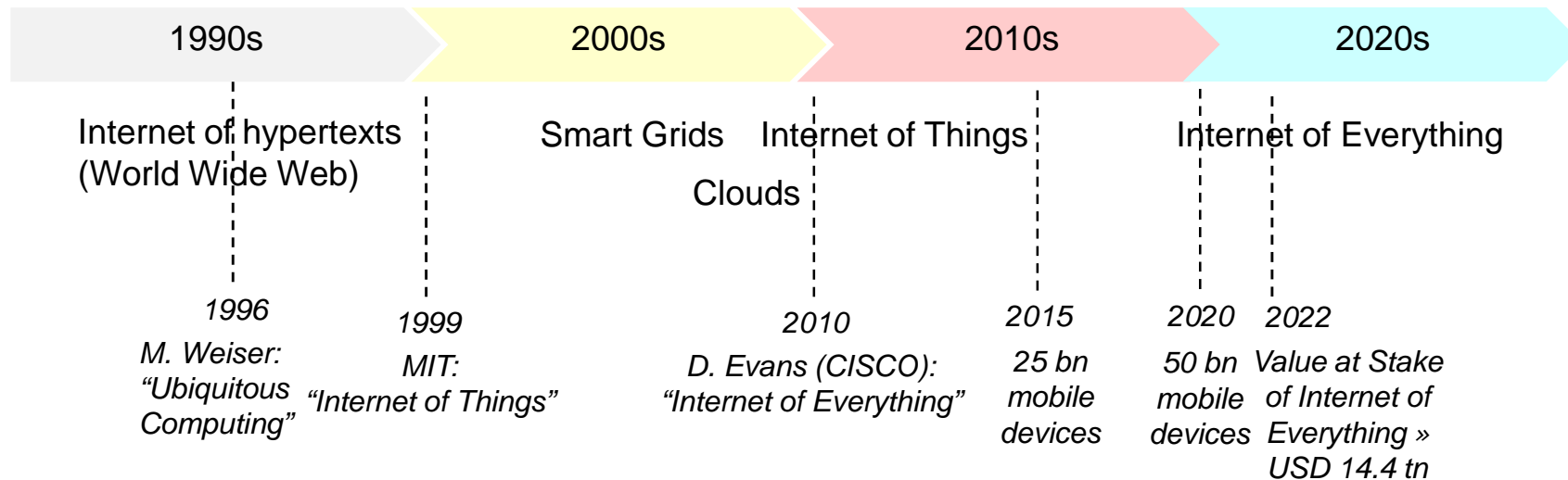
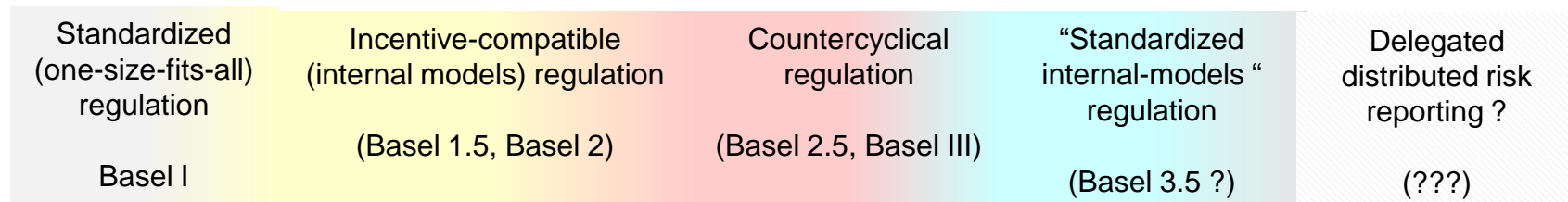
- ü For clearing through central counterparties: initial and variation margin
- ü For uncollateralized OTC trades: Credit and Debt Value Adjustments (CVA, DVA, FVA?)
- ü For collateralized OTC trades: Potential and Expected Future Exposure (PFE, EFE)
- ü Portfolio optimization and long-term investment strategies
- ü High-frequency trading
- ü Stress-testing and “living wills”

Regulation-driven problems

- Very large computational tasks (Basel III (BCBS 2011, 2013), Solvency II (European Commission 2015))
- Reporting requirements in shorter time-frames

Source: Vynckier (2014)

Foresight 2025



Sources: [Zatuliveter and Fischenko \(2010\)](#), [Aston \(2009\)](#), [Bradley, Barbier, and Handler \(2013\)](#), [Evans \(2011, 2012\)](#), [Weiser \(1996\)](#)



“I have a dream” when ...

- J Proactive QIS for regulatory changes can be run with zero or low cost for financial institutions
- J Existing regulations have low compliance cost for market players
- J Regulatory reports can be produced in real-time
- J Time lag in supervisory corrective action is minimized
- J Regulatory reports can be independently verified by both regulators and market players
- J Regulatory implications of new business transactions can be modeled ex-ante by financial institutions

As an afterword...



"It was never that there was no way,

it has always been that there is some way."

Jaroslav Hašek

"The Good Soldier Švejk"

«Никогда так не было, чтоб никак не было.

Всегда так было, чтобы как-нибудь да было.»

Ярослав Гашек

«Похождения бравого солдата Швейка»

References

1. Ashton, Kevin (2009), "That 'Internet of Things' Thing. In the real world, things matter more than ideas," RFID Journal, June 22, (<http://www.rfidjournal.com/articles/view?4986>) Retrieved 2015-02-14
2. Basle Committee on Banking Supervision (1996), "Amendment to the capital accord to incorporate market risks," Basel, January.
3. Basel Committee on Banking Supervision (2011). "Basel III: a global regulatory framework for more resilient banks and banking systems - revised version," Basel, June.
4. Basel Committee on Banking Supervision (2013). "Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools," Basel, January.
5. Basel Committee on Banking Supervision (2013a). "Fundamental review of the trading book: a revised market risk framework," Consultative document, Basel, October.
6. Basel Committee on Banking Supervision (2014a). "Fundamental review of the trading book: outstanding issues," Consultative document, Basel, December
7. Basel Committee on Banking Supervision (2006). "International convergence of capital measurement and capital standards: A revised framework. Comprehensive version," Basel, June.
8. Basel Committee on Banking Supervision (2009). "Revisions to the Basel II market risk framework," Basel, July.
9. Basel Committee on Banking Supervision (2014b). "Revisions to the securitisation framework," Basel, December.
10. Basel Committee on Banking Supervision (2014c). "The standardised approach for measuring counterparty credit risk exposures," Basel, March.
11. Bradley, Joseph, Barbier, Joel and Doug Handler (2013), "Embracing the Internet of Everything to capture your share of \$14.4 Trillion: more relevant, valuable connections will improve innovation, productivity, efficiency & customer experience ," White Paper, Cisco Systems (http://www.cisco.com/web/about/ac79/docs/innov/loE_Economy.pdf) Retrieved 2015-02-14.

References

12. European Commission (2015), “Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II),” Official Journal of the European Union, 17.1.2015.
13. Evans, Dave (2011), “The Internet of Things. How the next evolution of the Internet is changing everything,” Cisco White Paper, Cisco Systems, April 11 (http://www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf) Retrieved 2015-02-14.
14. Evans, Dave (2012), “The Internet of Everything. How more relevant and valuable connections will change the world,” (<http://www.cisco.com/web/about/ac79/docs/innov/IoE.pdf>) Retrieved 2015-02-14.
15. Kupiec P. H., O’Brien J. M. “The pre-commitment approach: Using incentives to set market risk capital requirements,” FRB Finance and Economics Discussion Series No. 14, Board of Governors of the Federal Reserve System, 1997.
16. Lobanov, Alexey (2012), “Current trends in prudential regulation of market risk: From Basel I to Basel III”, In: Sornette, Didier; Ivliev, Sergey; Woodard, Hilary (eds.) Market Risk and Financial Markets Modeling – Springer, pp. 129–139 (<http://www.springer.com/economics/financial+economics/book/978-3-642-27930-0>) Retrieved 2015-02-14.
17. Vynckier, Erik (2014), “High-Performance computing in finance: Why HPC? Why now?” Presentation at Emerging Technology Conference 2014, Manchester, April 11th (<http://www.hpcfinance.eu/>) Retrieved 2015-02-14.
18. Weiser, Mark (1996), "Ubiquitous computing". (<http://www.ubiq.com/hypertext/weiser/UbiHome.html>) Retrieved 2015-02-14.
19. Zatuliveter, Yurii, and Elena Fischenko (2010), “Graph-dynamic systems with network-centric control in mathematically uniform field of computer information,” In: Large systems control, Institute of Control Sciences of the Russian Academy of Sciences, Issue 30-1 (in Russian).

QUESTIONS???