

HIGHER SCHOOL OF ECONOMICS  
NATIONAL RESEARCH UNIVERSITY

*Henry Penikas*

**FINTECH REGULATION SUBJECT  
TO HUMAN PSYCHOLOGY**

Working Paper WP7/2018/01  
Series WP7

Mathematical methods  
for decision making in economics,  
business and politics

Moscow  
2018

УДК 336.7  
ББК 65.262.2  
P40

Editors of the Series WP7  
“Mathematical methods for decision making  
in economics, business and politics”  
*Fuad Aleskerov, Boris Mirkin, Vladislav Podinovskiy*

P40 **Penikas, Henry.**  
FinTech Regulation Subject to Human Psychology [Text] : Working paper WP7/2018/01 / H. Penikas ; National Research University Higher School of Economics. – Moscow : Higher School of Economics Publ. House, 2018. – (Series WP7 “Mathematical methods for decision making in economics, business and politics”). – 36 p. – 11 copies.

Ten years after the global crisis of 2007–2009 the financial regulation has being enhanced with the pace of world stock markets growth. Latter ones have hit their historical maximum values being two to three fold higher than on the eve of the crisis. Such prudential tightening incentivizes using financial technologies to create new banking products and optimize regulatory burden. Same time it inflates the stock market bubble leading to greater fragility and increases the probability of another global crisis. Current research shows how human psychology has to be accounted for. This is relevant both for humans managing financial institutions as objects of regulation and humans benefiting from regulation when consuming financial services. It is shown that unconventional policy measure of abandoning both regulation and state deposit insurance enables to enhance financial stability. It implies more conservative behaviour and diminishes risk-appetite for both financiers and their clients.

УДК 336.7  
ББК 65.262.2

*Keywords:* Basel Committee; prudential spiral; regulation; risk; traffic

*JEL Codes:* G28, E58, R41.

**Author biography:**

Henry Penikas is an associate professor at the Department of Applied Economics and at the International Laboratory of Decision Choice and Analysis (DeCAN Lab) of the National Research University Higher School of Economics (HSE). He is a senior research fellow at the Laboratory of Mathematical Modeling of Complex Systems of P.N. Lebedev Physical Institute.

Contact details of the corresponding author: Penikas@hse.ru; URL: <https://www.hse.ru/en/staff/Penikas> Russian Federation, 119049, Moscow, 26 Shabolovka Street, Office 2110. Tel. +7.916.514.16.20.

Author is grateful to V. Aggarwal, F. Aleskerov, E. Bavykin, M. Ermolova, A. Gogol, L. Grebnev, Yu. Dranev, V. Eremin, G. Kantorovich, A. Karminsky, V. Ladyzhets, S. Pekarsky, V. Polterovich, I. Pospelov, W. Selmier, M. Surkov, A. Vernikov for fruitful feedback onto earlier versions.

The paper was prepared within the framework of the Basic Research Program at the National Research University Higher School of Economics (HSE) and supported within the framework of a subsidy by the Russian Academic Excellence Project “5-100”.

© Henry Penikas, 2018  
© National Research University  
Higher School of Economics, 2018

Regulation will never be ahead of innovation.

*Bill Peduto,  
Mayor of Pittsburgh, where self-driving  
cars were first tested in Sep. 2016*

## **Introduction**

On December 07, 2017, the Basel Committee on Banking Supervision (Basel Committee, BCBS) published a paper summarizing Basel III’s novelties intended to strengthen financial stability worldwide.<sup>1</sup> Eight years had passed since the two first consultative documents were released on December 01, 2009.<sup>2, 3</sup> The European Union had published a revision to a 2004 document, the Markets in Financial Instruments Directive (MiFID II), which would take effect on 03 January 2018.

It is little known that during the eight years from 2009 to 2017, the Basel Committee produced 345 documents. Content-wise, this production implied increasing requirements for risk-management processes and for capital and liquidity prudential ratios requirements. The implementation deadlines for the finalized Basel III rules start in 2022 and are expected to be fully phased-in by 2027, i.e., 20 years after the financial crisis of 2007–2009. One must remember that Basel I, Basel II, and the first versions of Basel III either took too much time to discuss and implement or were too granular. However, simple but fast-to-implement rules were highly in demand to potentially prevent crisis events.

Despite that huge regulatory output of Basel III-related documents, the economic environment remained volatile, which is why easy solutions to raise capital requirements are still being offered. This paper’s objective is to set up the optimal regulatory framework, i.e., to define optimal “road rules” for bankers, that can dampen financial fragility, as the current one developed by the Basel Committee only exacerbates it. To achieve this goal, one must learn

---

<sup>1</sup> BCBS. Basel III: Finalising post-crisis reforms. URL: <https://www.bis.org/bcbs/publ/d424.htm>

<sup>2</sup> BCBS (2009) Strengthening the resilience of the banking sector. URL: <https://www.bis.org/publ/bcbs164.htm>

<sup>3</sup> BCBS (2009) International framework for liquidity risk measurement, standards and monitoring. URL: <https://www.bis.org/publ/bcbs165.htm>

from past production regulations and consumption of comparable goods with a special focus on traffic flow regulation.

The paper has the following structure. First, stylized facts about the current risk regulation's burdensome nature are provided, which include the schedule of the increase in capital requirements and the increasing volume of regulatory documents the Basel Committee developed. Second, the rationale of relying on traffic flow regulation is presented in the prototypical optimal financial risk regulation framework. For better understanding, key terms from both fields are mapped to each another. Third, traffic flow regulation experience is analysed, including a discussion of junction infrastructure, safety features' impacts, and liability insurance. Recommendations for risk regulation are derived. Fourth, the regulation outcome is discussed, including agents' adaptation to regulations requiring other incentive mechanisms. Fifth, the paper concludes with the preliminary list of recommendations for an optimal financial risk regulation framework design.

## **1. Current state of banking risk regulation**

The Basel Committee on Banking Supervision (Basel Committee, BCBS) is considered the global standard setter for financial risk regulation. Established in 1974, it was a sort of best practices consolidator in the domain of risk management and risk regulation. Only in 2012 did the committee change its policy and officially proclaim that it intended not to limit itself to publishing recommendations but also to control its implementation. That activity is called the regulatory consistency assessment program (RCAP). Within the RCAP, committee-member countries are inspected with respect to the mode of Basel III liquidity and Basel II capital regulation implementation. By December 9, 2016, BCBS finalized the review of all its member jurisdictions. For instance, the European Union was considered the only materially non-compliant jurisdiction. Greenwood and Roederer-Rynning claim that deviation from the standards is the European Parliament's strong feature, as it was able to adjust the universal standards with respect to local specifics.<sup>4</sup>

---

<sup>4</sup> Greenwood, Gustin, Roederer-Rynning, Christilla (2015) The "Europeanization" of the Basel process: Financial harmonization between globalization and parliamentarization. *Regulation & Governance* 9: 325–338.

Capital is considered the cushion against losses, which is why, since the BCBS's establishment, much attention has been paid to how much capital a bank has on its balance sheet, i.e., the capital-to-assets ratio. Looking back almost two centuries, one may observe that the capital-to-assets ratio drastically plunged from approximately 80 percent in the 1850s to approximately 10 percent in 2016, i.e., an eight-fold drop (for dynamics, please refer to Figure 1).

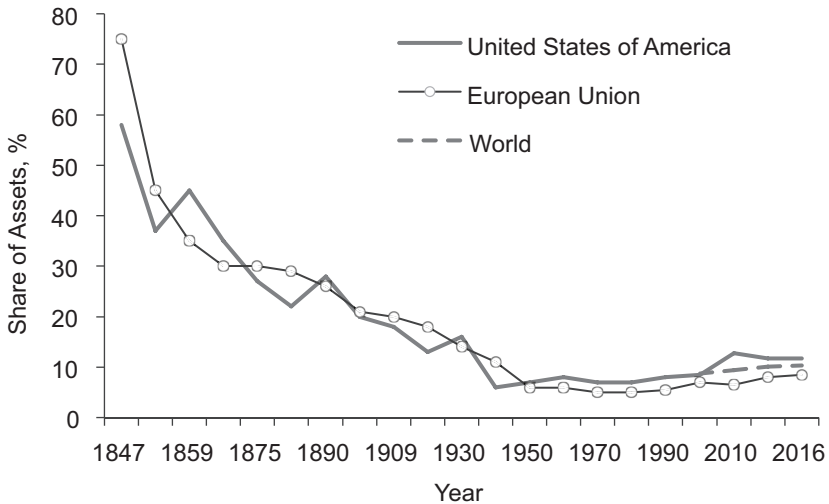


Figure 1. Historically, capital ratio was gradually declining worldwide

One may observe that the share of capital against assets (capital-to-assets ratio) has plunged approximately eight times in the last 175 years. It was approximately 80% in 1847 and approximately 10% in 2016. This is observed both for the United States of America and for the European Union. Such a decline in capital-to-assets ratio might be associated with the increase in bankers' risk appetites, as they risk by losing smaller amounts of their own money in relative terms. This trend might have triggered regulators to require higher minimum capital from banks.

Data Source: USA 1834–2000 (Gorton, 2012); EU 1847–2000 from Benink, Benston;<sup>5</sup> USA, EU, World 2000–2016 – World Bank Data.

<sup>5</sup> Benink, Harald, and Benston, George (2005) The future of banking regulation in developed countries: Lessons from and for Europe. *Financial Markets, Institutions & Instruments*, 14(5), 289–328.

Let us think of the factors that drove the capital-to-assets ratio down. First, project risks diminished due to technological progress. Second, the number of investment opportunities has risen to diversify idiosyncratic risk. Third, the banks grew in absolute terms, including interbank merges. According to Schumpeter, mergers help banks deal with global uncertainty, i.e., to diversify systemic risk.<sup>6</sup> Fourth, regulators extended their support to bankers, which includes state deposit insurance and bailout programs. As a result, the portion of their own funds to assets declined because of lower risks for bankers.

Disregarding the reasons for a natural drop in capital-to-assets ratio, regulators are still concerned about whether banks can absorb new losses without resorting to taxpayers' funds, one of the concerns aggravated during the Great Recession of 2007–2009. Post-crisis academicians, including Davis et al., argued that current regulation still has to be tightened and capital requirements has to be increased even more.<sup>7,8</sup> For example, Dewatripont and Tirole argue that higher capital requirements keep banks from excessive risk taking by internalizing loss absorption.<sup>9</sup> Blinder, Aliber and Kindleberger believe the current state of banking regulation is too lax.<sup>10,11</sup> Chang compares the financial system to traffic flow and suggests tighter regulation is needed because cars (read – financial institutions) are too large and heavy, and their paths (read – products) are too complicated.<sup>12</sup> Wagster claims that recent Basel III capital increase requirements are not as large as they should be or at least as they were in Canada in the 1930s. The latter helped Canadian banks survive the Great Depression.<sup>13</sup>

---

<sup>6</sup> Schumpeter, Joseph (1934) *The Theory of Economic Development*. Cambridge, Mass.: Harvard University, 1934. Translated from German in 1983 by Transaction Publishers, New Brunswick, New Jersey.

<sup>7</sup> Davis, Stephen, Lukomnik, Jon and David Pitt-Watson (2016) *What They do with Your Money: How the Financial System Fails Us and How to Fix It*. Yale University Press.

<sup>8</sup> Financial Times. 09 November 2010. Healthy Banking System is the Goal, not Profitable Banks. Letter signed by 20 economists. URL: <https://www.gsb.stanford.edu/faculty-research/excessive-leverage/healthy-banking-system-goal>

<sup>9</sup> Dewatripont, Mathias, and Jean Tirole (1994) *The prudential regulation of banks*. MIT press.

<sup>10</sup> Blinder, Alan (2013) *After the Music Stopped: The Financial Crisis, the Response, and the Work Ahead*. Penguin Books. P. 463.

<sup>11</sup> Aliber, Robert Z. and Charles P. Kindleberger (2015) *Manias, Panics, and Crashes: A History of Financial Crises*, 7<sup>th</sup> edition. Palgrave Macmillan. P. 238.

<sup>12</sup> Chang, Ha-Joon (2014) *Economics: The User's Guide*. Bloomsbury Press.

<sup>13</sup> Wagster, John (2012) Canadian bank capital during the Great Depression of the 1930s: A comparison to the Basel III requirements. *Journal of Banking Regulation* 13(2): 89–98.

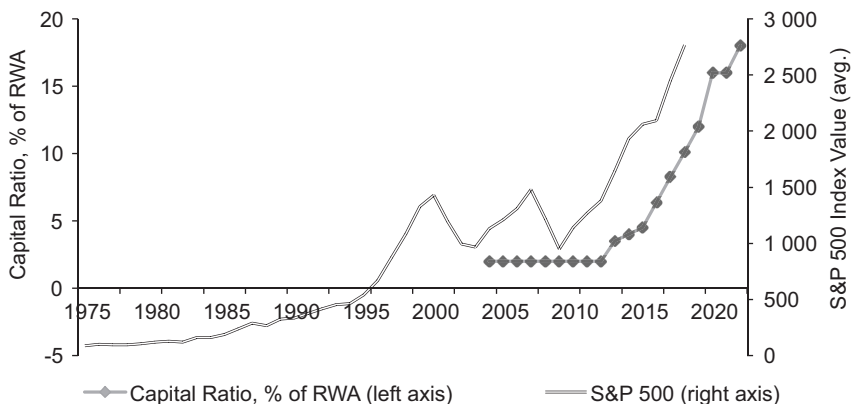


Figure 2. Increase in capital requirements seems to drive asset prices

RWA (risk-weighted assets) are the denominator of the capital adequacy ratio (capital ratio). The ratio minimum is established as a world benchmark for banks' soundness. A lead co-dependence is observed between the stock market index and the minimum capital requirements the Basel Committee introduced for internationally active banks which implies the hypothesis that the stock market boom might have been driven by those requirements, as it is much easier for banks to boost their profit through asset purchases and consecutive asset price hikes rather than by either limiting dividend payouts or soliciting for equity injections. The observed co-dependence implies two states of the world. Either the minimum capital requirements are permanently raised to support stock market growth and illusionary financial prosperity or the pause in its increase might lead to a boom-bust and financial crisis. To avoid the latter, immediate actions to fundamentally redesign regulatory framework are needed. The latter should not be focused on minimum capital requirements; neither should they comport deposit insurance guarantees and last sanity checks of banks' standing regulators.

This need led to the introduction of Basel III. One of its requirements was to raise the portion of common equity tier-one (CET1) capital as a percent of risk-weighted assets (RWA), a measure of the amount of risks taken by the institution. It was 2 percent during the Basel II era of 2004–2006. Basel III required banks to raise it to at least 4.5 percent and to 12 percent with all three capital buffers fully phased in.<sup>14, 15</sup> The stock markets' recovery by 2013 might

<sup>14</sup> General Manager of BIS Jaime Caruana mentioned two percent of RWA. For details, please, refer to Annex "Strengthened capital framework: from Basel II to Basel III" to speech on 15 September 2010. URL: <http://www.bis.org/speeches/sp100921a.pdf>

<sup>15</sup> Capital buffers include conservation, countercyclical, systemical importance ones. Each cost 2.5 percent of RWA. Basel III phase-in arrangements. URL: [http://www.bis.org/bcbas/basel3/basel3\\_phase\\_in\\_arrangements.pdf](http://www.bis.org/bcbas/basel3/basel3_phase_in_arrangements.pdf)

have relieved regulators' concerns about capital base. As a result, new capital requirements were introduced, known as total loss absorbing capacity (TLAC). In essence, the requirement was just to raise the capital base to 18 percent of RWA.<sup>16</sup> The consecutive increase of the minimum capital requirement is presented on Figure 2.

One may note that the stock market index coincides with the prospective rise in minimum capital requirements. It may seem that the latter drives the stock market even if the prudential rise is to take place several years after the announcement. This may be called a "prudential spiral." Regulators recognize that asset prices are inflated, so they expect them to fall in the near future. This price decrease will result in losses to banks, so they need to accumulate a cushion to absorb those future losses. To stimulate cushion accumulation, regulators decide to increase capital requirements. Given the non-declining return on equity (ROE), new capital requirements imply the need to earn more profits. The easiest way is to inflate asset prices more and book profits as a result of asset upside revaluation. To inflate prices, one has to start buying assets. Funding comes from profits accumulated in equity due to the price rise from one side and from using cheap borrowed funds from Europe and Japan with continued quantitative easing (QE) programs from the other side. Thus, asset prices rise even more. The regulator observes prices being inflated and once again increases capital requirements. The so-called 'prudential spiral' reiterates until it reaches a point when one agent decides to fix its profit and starts selling assets. Alternatively, governments might raise in key rate or stock asset purchase end-of-QE programs.

This bubble's burst would be devastating because of interconnectedness unmanaged by the regulators. Remember that high valuation (capitalization) of tech giants (IT companies) is to a large extent driven by them. This is not direct buyback but a cross-holding. Take Apple as an example. One-third of its assets are invested in other IT companies' stocks,<sup>17</sup> which implies that any retreat by the stock exchange will result in a cascade (contagion) effect, i.e., the price fall will be several times larger than the initial correction (adjustment) from the individual sell-off (fire sale). Given that stock market indexes are at historical highs and are mostly twice as high as they were prior to the 2001 and 2007 crises, one may expect the crash to be more devastating than that of the Great Depression of 1929.

---

<sup>16</sup> BCBS. 2016. "TLAC holdings. Standard. Amendments to the Basel III standard on the definition of capital." URL: <http://www.bis.org/bcbs/publ/d387.pdf>, p. 10.

<sup>17</sup> The Economist, 28 October 2017, Apple should shrink its finance arm before it goes bananas.



Therefore, prudential requirements to raise capital end with the “cobra effect.” Siebert introduced the term,<sup>18</sup> which describes the situation when the opposite of the intended policy objective is reached. The term refers to the population of cobras quadrupling when colonialists started paying for every cobra in India to die. The objective to make banks more solvent results in more burden and more financial fragility.

In addition to financial (capital) burden, current regulations represent a procedural burden to banks for they have to meet not only minimal capital requirements but also requirements for the organization of risk management and corporate governance. Basel III constitutes the largest contribution to the overall burden. Therefore, if the total number of the Basel committee documents is 802, the Basel III compilation is 345, i.e., 43 percent of the total number of documents. If the total number of pages of BCBS published documents is 24’603, for Basel III, it is 11’438 pages, i.e., 47 percent of the total number of pages. For the evolution, please refer to Figure 3 (data updated as of October 04, 2018; for methodology, please, refer to Penikas). Of course, grandfathering of documents occurs, i.e., not all of them are active simultaneously, but risk-managers within banks are expected to have read all of them to contribute to the document development process. To be honest, it is difficult to define the optimal amount of regulation to be able to judge that the current one is exorbitant. Nevertheless, we may surely conclude that the regulation burden rises dramatically.

For comparison, the U.S. equivalent of Basel III is the Dodd-Frank Act, which is three times smaller, i.e., comports approximately 3k pages. Although it is still large, Aliber and Kindleberger do not see any harm in the Dodd-Frank act.<sup>11</sup> Let us remember the shipping analogy the Chairman of the Basel Committee used in November 2015. In the sixteenth century, a large warship, Vasa, was built. It consumed 40 acres of timber and required three years to be constructed. Disregarding the immense resources invested, it sailed approximately one mile and sank.<sup>19</sup> The BCBS Chairman compared Basel II published in 2006 to Vasa and hoped Basel III proposed in 2009 and finalized in 2017 would have another destiny.

Such an increase in prudential regulation is driven by the argument that deregulation is counter-stabilizing and leads to financial crises. Westernhagen

---

<sup>18</sup> Siebert, Horst (2001) *Cobra Effect: Where the Solution is Worse Than the Problem*. Deutsche V.-A. (DVA), Stgt.

<sup>19</sup> Ingves, S. From Vasa to the Basel Framework: The Dangers of Instability. 2 November 2015. URL: <http://www.bis.org/speeches/sp151102.htm>

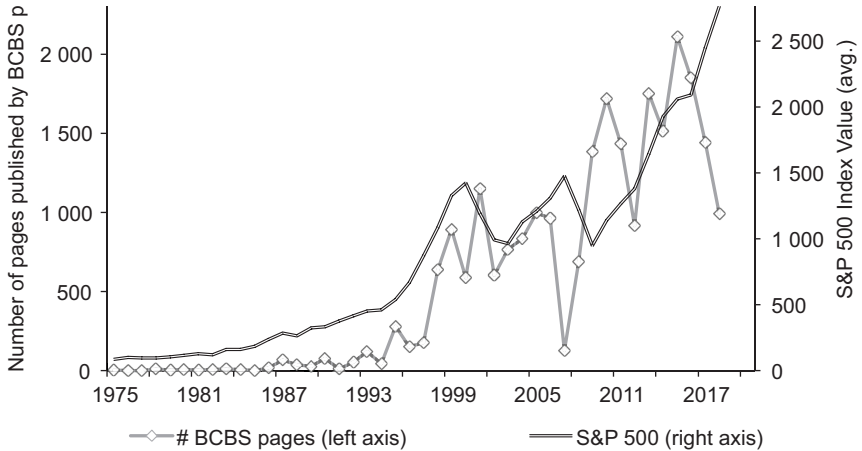


Figure 3. The Basel Committee issued 802 documents worth 25k pages in 44 years

The figure shows the number of document pages the Basel Committee produced. It is visually benchmarked against the stock market index of S&P500. Hence, we may conclude that the Basel Committee produces retrospective regulation. The volume of published documents in pages and in number rises in response to a crisis, not to prevent one. Therefore, when the 2001 dotcom bubble burst, the Basel II Accord was presented, leading to the first hike in publication activity. When the Great Recession of 2007–2009 struck, Basel III created a second large hike in publication volumes. This trend supports the hypothesis that an increasing volume of prudential guidelines is not a remedy for financial instability. A new regulatory framework must incentivize instead of merely reshaping formal constraints.

et al. argue deregulation caused the crises in the United States, Japan, Norway, Denmark, Spain, Sweden and Germany prior to the 2000s.<sup>20</sup> Goodwin et al. and Krugman think deregulation led to the “Great Recession” in the United States in 2007–2009.<sup>21, 22</sup>

<sup>20</sup> v. Westernhagen, Natalja, Eiji Harada, Takahiro Nagata et al. (2004) Bank Failures in Mature Economies. Working Paper 13. Basel Committee on Banking Supervision. URL: [http://www.bis.org/publ/bcbs\\_wp13.pdf](http://www.bis.org/publ/bcbs_wp13.pdf). P. 66.

<sup>21</sup> Goodwin, Neva, Jonathan Harris, Julie Nelson, Brian Roach and Mariano Torras (2013) Chapter 15 – The Financial Crisis and the Great Recession. In: *Macroeconomics in Context*, Second Edition. Routledge. Chapter 15 – The Financial Crisis and the Great Recession. P. 346.

<sup>22</sup> Krugman, Paul. “Moral Decay? Or Deregulation?” New York Times. 30 September 2009. URL: <https://krugman.blogs.nytimes.com/2009/09/30/moral-decay-or-deregulation/>

Although the amount of produced regulation is large, it does not seem to reach the objective of fostering financial stability. For instance, Basel I did not prevent the Asian or Russian crises of 1997 and 1998, nor did Basel II did prevent the Great Recession of 2007–2009 the creation of the Madoff financial pyramid in approximately 1987 and its collapse in 2009, or from “Flash Crash” of 2010. Nor was Basel III a remedy for the “Lending Club” (a fintech start-up) fraud in May 2015 or for the January and June 2016 global stock market turbulence. Instead, some have hypothesized (though not unilaterally proven nor officially accepted) that Basel I might have worsened the 1991–1992 crisis in the United States, as the end of transitional arrangements for Basel I’s introduction after 1988 occurred exactly in 1991–1992, according to Goodhart.<sup>23</sup> The procyclical effects embedded into Basel II’s might have exacerbated the effect of Great Recession of 2007–2009, as its three-year transitional arrangements for implementation past 2004–2006 ended on 2007–2009. Moosa and Cathcart et al believe that Basel II caused or at least reinforced the aforementioned subprime crisis.<sup>24, 25</sup> To be fair, disregarding the above cases, no one knows how many crises Basel I-III prevented.

It was shown above that the current banking regulations that originated from Basel I-III create extra financial and procedural burdens for banks and do not improve financial stability. The World Economic Forum survey on regulation burden supports this claim.<sup>26</sup> Having monitored the evolution of regulations in 148 countries from 2006 to 2014, it shows that the largest regulatory burdens, which are in place in Greece (ranked No. 144 out of 148), Italy (146/148) and Brazil (147/148), did not help them avoid significant financial distress.<sup>27</sup>

Let us recall the origins (justification) for banking regulation, i.e., why regulation is in place for banks and nothing similar for other companies (e.g., industrial ones). First, market failures are often claimed to justify the need for

---

<sup>23</sup> Goodhart, Charles (2011) *The Basel Committee on Banking Supervision. A History of the Early Years 1974–1997*. Cambridge University Press.

<sup>24</sup> Moosa, Imad (2010) Basel II as a casualty of the global financial crisis. *Journal of Banking Regulation* 11(2): 95–114.

<sup>25</sup> Cathcart, Lara, El-jahel, Lina, and Ravel Jabbour (2017) Basel II: An Engine without Brakes. *Journal of Banking Regulation* 18(4): 359–74.

<sup>26</sup> The Economist, 22 February 2014. Regulation Tangled. The rich world needs to cut red tape to encourage business. The Economist. URL: <http://www.economist.com/node/21596673/print>

<sup>27</sup> Deeper research of regulatory burden and economic performance at the country level fall out of the scope of the current paper.

regulation. Second, the number of banks was historically much smaller than that of industrial entities. Moreover, regulators think that all banks can be well-supervised. Third, governments have promised to pay on deposits in the case of bank failure, or they wish to manage moral hazard in the presence of deposit insurance schemes, as Gordy et al. explain,<sup>28</sup> which is why governments feel responsible for ensuring banks do not take excessive risks and why the probability of a bailout or a deposit insurance fund being utilized is negligible.

Today, all three arguments are insufficient to justify existing regulation for the following reasons. First, government failures occur parallel to market failures there are. Just remember parallels from traffic flow regulation. All other things being equal, more accidents occur when the traffic scheme (junction, regulation, etc.) is poorly designed, which is why with the current burden of 22k pages of BCBS documents produced, the higher risk of overly granular but inadequate regulation is much higher. Second, fintech start-ups grow at a pace that regulation cannot match.<sup>29</sup> Supervision may cover only most material entities, but it does not change human psychology. People are prone to gambling and excessive risk taking if their bonuses are linked to stocks and performance (disregarding the complexity of remuneration rules). They will create as many entities as needed if they help them avoid supervision and associated capital or procedural burdens. Third, state deposit insurance agencies worldwide have accumulated systematic deficits because they were used more often than needed.<sup>30</sup> No need exists for funds to provide deposit insurance at no additional cost for taxpayers. Instead, deposit insurance schemes should be activated only in crises (e.g., in Australia in 2009) but not at all in calm times.

For publicly listed companies, the golden figure of debt-to-equity ratio maximizing company valuation may be found, but it varies between sectors and with time, which is why banks can exist in the exact same way without current overregulation as industrial enterprises do. Therefore, the very assumption of the need for regulation does not hold. As will be shown below, the regulatory measure must also be drastically changed.

---

<sup>28</sup> Gordy, Michael and Eric Heitfield, Jason Wu (2015) Risk-Based Regulatory Capital and the Basel Accords. In *Oxford Handbook of Banking*, edited by Allen Berger, Phil Molyneux, and John O.S. Wilson. Second Edition, Oxford University Press. P. 550–67.

<sup>29</sup> BCBS. Implications of fintech developments for banks and bank supervisors – consultative document. 31 August 2017. URL: <http://www.bis.org/bcbs/publ/d415.htm>

<sup>30</sup> Ingves S. Remarks given at IADI conference on “Designing an Optimal Deposit Insurance System.” 2 June 2017. URL: <https://www.bis.org/speeches/sp170602.htm>

## 2. Mapping to traffic flow regulation

To assure financial stability, let us learn from three peer-regulatory domains: regulation of air pollution, natural monopolies; and traffic flows. Let us look the remedies banking regulation may extract from these examples.

First, air pollution regulation (namely, the Kyoto protocol) requires companies to pay for the amount of polluted emissions they will produce. The key takeaway for banking regulation might be to price a good (risk) and pay for its use beforehand instead of keeping cushions of capital, as is now required. Stiglitz (2008, p. 4) said in October 2008 that Wall Street has polluted the economy with toxic assets, and it had to pay for the cleanup.<sup>31</sup>

Second, natural monopolies tend to exploit a natural resource. Because of resource uniqueness, monopolies try to collect the total consumer surplus, resulting in the decrease of consumer welfare. Regulations step in to raise it. The major obstacle is that no external agent knows the exact production costs of natural monopolies, which is why the size of the surplus retained by the monopoly is not evident. A solution used in practice is to require natural monopolies to by any means constantly improve efficiency regardless of its current level. Hence, one may think of systemically important financial institutions (SIFIs) as natural monopolies. Their natural resource is systemic risk. The key takeaway for banking regulation is to require banks to permanently improve efficiency (e.g., in terms of cost efficiency).

Third, traffic flow regulation deals with drivers' risk taking (you can neither move nor turn without taking a risk). One has to take on risk when completing financial transactions (lending credit, purchasing stocks, etc.). Risk taking is one of the fundamental features of human psychology. Banking and traffic regulations have an objective to assure security, i.e., to minimize risk, and simultaneously to minimize congestion (increase smoothness and speed of traffic and of transactions). Security breaches (risk realizations) are called accidents, crashes when we speak about traffic and defaults (losses) when we talk about financial risk. Financial risk and traffic flow regulation are meant to minimize the possibility of an accident or probability of default, thus reducing injury in the event of crash or loss from default, respectively.

---

<sup>31</sup> Stiglitz, Joseph (2008) *We Aren't Done Yet: Comments on the Financial Crises and Bail-out*. URL: <http://cemi.ehess.fr/docannexe/file/2779/stiglitz.pdf> [Accessed – August 15, 2016; Open access]. P. 4.

A flow of cars aims to reach some geographical point often within a certain time period. They may produce jams and accidents. All these features are observed in banking which is a financial flow of transactions that aim financing certain activities with particular maturity requirements (either investing into a project or taking a consumer loan or mortgage). They also may result in losses (accidents) or be delayed or suspended (e.g., because of compliance due diligence or because of operational risk realizations). Likewise, automobile traffic is of interest, as people deal with it in various roles (as a driver, a passenger or a pedestrian), which is why everyone may better grasp the parallels from traffic flow regulation than from the aforementioned areas of pollution or natural monopoly regulation.

It is important to particularly stress why banks should be compared to traffic flow or to intersections (junctions) rather than cars. A bank is a set of transactions, and traffic flow is a set of cars. Each element of the flow may move at a different speed, entailing various risks and probable consequences of crashes and injuries for others (consider contagion effects for interrelated economic agents, particularly borrowers). Moreover, financial risk originates from capital flows, not from an institution's mere existence. One should compare a bank to a traffic flow and consider the following analogy. The traffic regulator may choose which goes first (that might be an emergency or police car). Similarly bank management may decide which loan to offer and which one to reject. When one compares a bank to a car, such treatment as well as the following parallels would be non-applicable, which is why Chang wrongly shows that because of cars becoming heavy, tighter regulation is required. The opposite is necessary. When they become large enough, banks require less regulation. Having mapped key the terms, let us proceed to comparisons with other regulatory features (for structured details, please refer to Appendix I).

Hereafter, most of the parallels will be discussed based on automotive traffic regulation with particular cases from shipping, railway and airplane traffic situations. The latter has less density in general, which is why they are less interesting from a regulation perspective except for cases with high traffic concentration, e.g., loose spots or channels.

The idea of the paper is to discuss below the experience of traffic flow regulation in terms of pre- and post-accident issues, regulation outcome and implications to derive recommendations for the optimal design of the financial risk regulation framework, i.e., the optimal "road rules" for bankers.

### 3. Regulation rules

We would like to identify several components of regulation rules. One subsection below is devoted to each of them. First, there are pre-accident measures, which include **infrastructure design** and safety features. Traffic infrastructure design stands for road junction type, traffic light allocation, rules of road-junction passing and moving in general, etc. Infrastructure for banks means proportionally a criterion that is applicable when deciding upon the internal capital adequacy assessment process (ICAAP), i.e., various supervisory treatments apply to banks of various sizes and business strategies (tighter supervision is carried out for the largest and the most complicated institutions). Capital buffers are assigned according to the category of systemic importance. Second, safety features can be divided into internal and external ones. **Internal safety features** for vehicles include safety belts, bumpers, airbags, anti-blockage system (ABS), trajectory stabilization programs (TSP), line-keeping, automated breakage and GPS navigation. Internal safety features for banking include collateral treatment and generally the use of internal models for risk measurement. Capital buffers act in banking, in part, similarly to bumpers in traffic security. **External safety features** would be associated with the regulation of traffic flow parameters, i.e., with speed-checking cameras. Capital and risk-weighting floors and caps in banking regulation are the equivalents of flow parameter regulation. Third, post-accident measures for traffic flow regulation include third-party liability **insurance**. Financial risk examples of post-accident treatment include deposit insurance. Let us look at each of the aspects in greater detail.

#### 3.1. Infrastructure Design

Modern road traffic infrastructure has several types of road junctions: simple junctions with no traffic lights (uncontrolled junction and priority intersection), roundabouts, junctions with traffic lights (or signal-controlled ones) and multi-level junctions (or grade-separated ones), using Bird's classification.<sup>32</sup> Generally when the traffic flow increases, the junction type evolves from the simplest one to the most complicated. The objective of and need for evolution is twofold: to enable cars to cross the junction at high speed, i.e., to

---

<sup>32</sup> Bird, Roger N (2009) Junction Design. In *Handbook of Transport Systems and Traffic Control*, edited by Kenneth J. Button, David A. Hensher. Bingley: Emerald Group Publishing Limited.

avoid congestion (or to have the least queues and jams possible), and to minimize the risk of accidents where diverse flows intersect.

The mentioned junction types vary, e.g., simple junctions come into being mostly naturally, whereas grade-separated ones need significant investments and a large available surface to plan and erect. The simpler the junction is, the more weight is attributed to rules that define the priority of crossing the road; the more complicated it is, the less weight is attributed to rules that define the priority to cross or pass the road. Junctions with traffic lights are intermediate solutions.

When reviewing the listed junction types, one may easily notice that in fact regulation is needed only for junctions with traffic lights. For the simplest junction types, established simple rules are enough to guide drivers when they meet at the junction. For grade-separated ones, regulation does not matter, as the junction design guides the drivers.

Regarding accidents, the majority of crashes happen at the junctions with traffic lights. At the simplest junctions, traffic intensity is small, and at the most advanced ones, the design prevents crashes. The key takeaway from this investigation of junction types is that regulation may be required for mid-sized banks, but it is redundant for the smallest and the largest. From a financial risk perspective, it means that globally and systemically important financial institutions (being the largest agents) as well as regional banks and microfinance entities (being the smallest ones) need not be regulated. As size may be manipulated, the most efficient regulation is its absence, i.e., application for all sizes of banks, which is in line with Selgin's concept of free banking.<sup>33</sup>

In three cases, the absence of regulation results in lower risk taking. First, the absence of the minimum prudential capital requirements in some of the U.S. states resulted in higher capital ratios in the beginning of the nineteenth century, as Spong and Regher and Gorton show.<sup>34, 35</sup> Second, traffic with no regulation has no accidents when there is no insurance and when no support is guaranteed. Consider driving in East Asia, e.g., in India. No one dares to cross the unregulated square at high speed, as he or she knows no regulator (or a traffic policeman) guides and takes responsibility for who is to cross

---

<sup>33</sup> Selgin, George (1996) *Bank Deregulation and Monetary Order*. Routledge. London and New York. P. 9, 18.

<sup>34</sup> Spong, Kenneth and Kristen Regher (2012) Kansas Banking in the 1930s: The Deposit Insurance Choice and Implications for Public Policy. *Federal Reserve Bank of Kansas City Economic Review* 3: 107–27.

<sup>35</sup> Gorton, Gary (2012) *Misunderstanding Financial Crises: Why We Don't See Them Coming*. Oxford University Press.



first, nor does any person or body restore or cover the car cost in the case of an accident. Recall also a project of a Danish engineer, Hans Monderman, when all traffic regulation and traffic signs were abolished in several European cities.<sup>36</sup> Third, if one wishes to drive comfortably, he or she should choose a well-developed traffic infrastructure or financial flows that are not burdened with regulatory pressure.

One may try to counter-argue that bank regulations are like multi-level junctions. This analogy is incorrect, however, because cars may move in multi-level junctions without any supervision from traffic police. Banking regulation needs supervision from “banking police.” Otherwise, when some banks are not supervised and stop following regulations, other banks follow with Nash’s strategy, not following regulations, either, which is why supervisors are needed and why it is incorrect to compare complicated regulations to multi-level junctions.

Having suggested eliminating centralized supervision from the financial actors, one must also think of air traffic regulation, which starts when the flow gets very tense, e.g., near airports. The role of the airport traffic regulator is to arrange the landing queue, i.e., to coordinate. The regulator’s coordinator role will be discussed later. However, it will show that there might appear private regulators for financial entities (mostly for the largest ones) that do not need to be centrally coordinated, as Buthe discussed.<sup>37</sup>

### ***3.2. Internal Safety Features***

Traffic participants (automotive vehicles) have safety features onboard to prevent crashes or minimize injuries in case of accidents. Historically, those features evolved from belts and bumpers to airbags and modern systems. The latter include ABS, TSP systems, lane keeping, automatic stoppage, etc. Disputes around the efficiency of those features seem to be permanent. Technologically, all of them indeed solve the immediate task for which they are created. The mostly unforeseen effect is the change in drivers’ behavior. When safety features are in place, drivers tend to take on more risk (moral hazard arises). They over-rely on the safety features, assuming they may offset more

---

<sup>36</sup> The Guardian. 2 February 2008. Hans Monderman. A radical Dutch traffic engineer, he redefined the thinking behind road safety. URL: <https://www.theguardian.com/news/2008/feb/02/mainsection.obituaries>

<sup>37</sup> Buthe, Tim (2010) Private Regulation in the Global Economy: A (P)Review. *Business and Politics* 12 (3): 1–38.

aggressive or more accident-prone driving. That trend is particularly obvious in the developing countries with an absent or undeveloped driving culture, as Blinkin and Reshetova mentioned.<sup>38</sup> Therefore, all other things being equal, the developing countries have a higher rate of accidents with modern cars equipped with advanced safety features than developed countries.

Modern financial institutions have an equivalent of internal safety features: internal risk assessment models, which were introduced by the amendment to Basel I in 1996 (Value-at-Risk, or Internal Models Method, IMM) and by Basel 3.5 in 2016 (Expected Shortfall); credit risk models came in with Basel II in 2004 (Internal Ratings-Based, IRB); operational risk models also were introduced by Basel II in 2004 (Advanced Measurement Approach, AMA). The key difference between these internal models for standard risk supervision is that the former (internal models) allows differentiating risk assessment, whereas the latter one (standardized approach) prescribes using rather unified and rough risk estimates for the purpose of capital adequacy computation.

Current risk-management and risk regulation practice requires the aforementioned internal models to gain preliminary approval from the regulator. Banks in developing countries tend to also switch from a standardized approach to internal models for capital adequacy estimation purposes. They are interested in capital release from lower average risk weights, resulting from internal model usage. However, they often forget that low risk weights reflect borrowers' high creditworthiness. The latter is rarely observed in developing countries.

Those internal models can be considered equivalent to car internal safety features because the bank default (crash at the junction) depends strongly on how accurately it evaluates the risk of its transactions (speed of cars). Here, the analogy of banks and traffic flow comes from the following. Internal models are more like indicators of the traffic. Those indicators may be attributed to the traffic flow participants. Therefore, more defaults may follow from having allowed banks in developing countries to blindly rely on internal risk assessment models. When the financial system is underdeveloped (equivalent to a low level of driving culture), the banks might over-rely on those safety features (on internal models), ending up with less financial stability overall. For visibility, imagine one is allowed to drive 10 km per hour over the general speed limit if the car is equipped with ABS, TSP, GPS, etc. Just think of

---

<sup>38</sup> Blinkin, Michael and Ekaterina Reshetova (2013) *Road Traffic Security: History, International Experience, Core Institutes*. Publishing House of the National Research University Higher School of Economics (in Russian).

operational difficulties originating from the need to define the presence and adequacy of such a system in a given car (remember the notoriously known case of Volkswagen emission manipulation that took much time to be identified).<sup>39</sup>

A further case justifies why large institutions should be exempt from regulation and the scope of supervision. Experienced drivers or racers would easily adjust to traffic parameters in average situations and require no external regulation, as they take into consideration all the determinants mentioned in the start of the paper (vehicle and road type, weather conditions, other participants' actions) from experience. Average drivers, however, are prone to accidents. Safety features might help them in general situations or light accidents. Hence, financial risk regulation may be of use for non-mature institutions, but for experienced drivers, the presence of safety features might in fact limit their ability to recover from or escape an accident. Therefore, most experienced drivers tend to switch off TSP systems, which are programmed to decrease power by two-thirds when a car starts making circles (e.g., from drift or oversteering). However, it is exactly the extra power and speed that helps experienced drivers stabilize their path with fast wheel rotation to counter the drift's direction. Similarly, regulation may even be harmful for large institutions.

The key takeaway here is that the use of advanced risk models should be allowed when a country's banking system has reached a certain level of development, including financial culture and literacy (at least, the level of the countries at the time when they started using Basel II internal models for bank supervision purposes, i.e., approximately G10 countries in 2006).

Another internal safety feature worth noting is the bumper (damper), which is used to absorb initial accident energy, preventing damage to the whole car. Bumpers are often made of light material, so they will be cheap to change and to decrease damage for other traffic participants. Now is the time to refer to railway traffic rules. Specifically, high-speed trains should not stop when the conductor notices a living being on the tracks, as a sudden stop might hurt more passengers inside the train than the sole one that happened to be an obstacle. Although it is obvious for cars and trains, bank regulators do not want banks to have bumpers (i.e., to treat prudential ratios as such).

The fundamental international financial risk regulation can be said to have started from the introduction of the capital adequacy measure in the 1988 Basel I Accord. It is a ratio of the amount of equity, subordinated debt and similar equity-type instruments divided by risk-weighted assets (RWA). It took

---

<sup>39</sup> BBC. Hotten R. 10 December 2015. Volkswagen: The scandal explained.

nearly eight years to agree on the measurement type (e.g., whether to use risk-weighting or not). If Avgouleas opts for regulation harmonization using conduct rules for the EU retail investors,<sup>40</sup> Gordy et al. (2015) support unification of capital rules worldwide. Unification enables even competition and excludes capital arbitrage opportunities, which is why Novembre explains that Basel I turned out much more weighted and well-perceived regulation, which was not the case for Basel II.<sup>41</sup> In 2010, Basel III introduced three capital buffers. Nevertheless, Peter Cooke, in the 1980s, raised doubt over whether the introduced capital measure should be a minimum or a target, as Goodhart found. In fact, the capital ratio and its buffers (but not only buffers) are expected to be a loss bumper in traffic terms. Banks should then be allowed to utilize one in times of crisis. Remember that railroads, like banks, must be allowed to incur losses when they are unavoidable for the sake of financial stability. Artificially introduced limits imply the need to use taxpayers' money for bailouts when those limits are breached.

The key takeaway is that banks' capital adequacy measure and other prudential ratios (leverage, liquidity coverage ratio (LCR), etc.) should be a target, not a minimum. As for simple junctions, a rule should dictate how to cross it when two drivers meet. After the rule is in place, it is the driver's responsibility to follow or violate it. Similarly, central banks issue recommendations, not minimum standards. More generally, such supervisory agencies might not even be central banks.

### **3.3. External Safety Features**

There are external features used to provide traffic flow safety. Those primarily include safety cameras used to check cars' speed. The use of speed cameras is a far more largely debated topic than the use of internal safety features. Wells accumulated much evidence on the experience of launching and operating speed cameras in the United Kingdom.<sup>42</sup> She started by describing

---

<sup>40</sup> Avgouleas, Emiliós (2000) The Harmonisation of Rules of Conduct in EU Financial Markets: Economic Analysis, Subsidiarity and Investor Protection. *European Law Journal* 6(1): 72–92.

<sup>41</sup> Novembre, Valerio (2009) The Bargaining process as a variable to explain implementation choices of international soft-law agreements: The Basel case study. *Journal of Banking Regulation* 10(2): 128–152.

<sup>42</sup> Wells, Helen (2012) *The Fast and The Furious: Drivers, Speed Cameras and Control in Risk Society (Human Factors in Road and Rail Transport)*. Surrey: Ashgate Publishing Limited.

the fundamental question of why there should be a punishment for speeding when no crash has occurred, i.e., if no accident happened, why a speed limit violation is a crime. The rationale for punishment is not the actual accident, but the probability of its occurrence. One should consider that the probability of an accident at high speed might be more negligible on an empty country road than one at low speed near a kindergarten (thus, two speed types are introduced: excessive, in excess of a limit, and inappropriate, inadequate with respect to environment; one type does not necessarily imply another). Wells also noted that speed camera installment had its effect at first implementation. There was a one-third decline in the number of accidents in the UK between 2003 and 2006. Nevertheless, further expansion of cameras did not end in a proportionate decline in speeding, as drivers adapted by lowering their speed when they approached cameras. That is why the country-wide national program was stopped in 2009.

Similarly to traffic speed regulation, the financial system has the practice of supervising financial institutions. Central banks often introduce their representatives to the boards of the largest institutions in addition to conducting regular on-site visits and inspections. The experience with the introduction of safety cameras for traffic control suggests that supervision may take place and sometimes may have benefits. Nevertheless, supervision expansion is inefficient when trying to have absolute coverage of all possible economic agents, not limited to the list of licensed credit institutions. That is why academicians are wrong when they think that everyone can be supervised, or in their words, that police may expand and patrol Main Street and all side streets, according to Admati and Hellwig.<sup>43</sup> Such supervision is costly and inefficient. At some point, every citizen might be assigned a would-be criminal status to merely justify such a huge number of police staff.

Chang also argued that regulation should be tightened. Nevertheless, perfect abeyance might be achieved if and only if no traffic (flow of transactions) takes place. Thus, the proposal to tighten regulation is similar to the concept of speed-camera universal proliferation, which is why financial regulation should be limited, not at all tightened further. The key takeaway is to limit supervision and supervisors' representations within financial institutions.

Consider another case. Experienced drivers (racers) surpass any safety systems and features compared to an average driver in average situations. Experienced drivers may even be harmed by those systems. At the same time, experi-

---

<sup>43</sup> Admati, Anat and Martin Hellwig (2013) *Bankers' New Clothes: What's Wrong with Banking and What to Do about It*. Princeton University Press. P. 225.

enced drivers may get to excessive speed in extreme cases (races included) when they set challenging objectives that average drivers do not dare to target. Average drivers would mostly never get or desire to get to those traffic parameters, as they recognize their limitations, though there might be some average drivers that may rely on luck to survive at high speeds. Large financial institutions might be compared to experienced drivers. The key takeaway then is that large financial institutions, may survive without any supervision or support. However, if they have overambitious objectives, no supervision will be helpful.

Having analyzed the pre-accident issues of traffic flow regulation, one may conclude that supervision coverage has to decrease, and to avoid manipulation, state regulation should be fully abandoned. Simple rules (an indication or a target) might be enough for the smallest banks, and no regulation is required when banks' internal models are approved. The latter can be done only for banks within the developed financial systems. Let us move on to a discussion of the post-accident issues, which involve insurance usage and the actions in case of an accident.

### **3.4. Insurance Usage**

Mandatory third-party liability insurance is used to form a pool of funds to compensate losses of innocent traffic accident participants. Similar to the introduction of internal safety features, third-party liability insurance incentivized drivers to take on more risk, as they knew that minor expenses in case of non-catastrophic accidents would be covered.

Financial institutions also had a type of third-party liability insurance that may have similar implications, known as deposit insurance. Depositors would receive their funds (often up to a limit) in case a bank went bust. This was done to increase clients' trust for banks. Nevertheless, banks and depositors began taking more risks, as external liabilities were protected by a deposit insurance agency, as explained by Hogan and Johnson.<sup>44</sup> To understand how such a "cobra effect" for deposit insurance occurred, let us briefly analyze the paper of Diamond and Dybvig (hereafter referred to as DD) that is often referred to as a rationale for stricter regulation and state deposit insurance introduction.<sup>45</sup> On one hand, the model approach was implemented in a biased

---

<sup>44</sup> Hogan, Thomas and Kristine Johnson (2016) Alternatives to the Federal Deposit Insurance Corporation. *The Independent Review* 20(3): 433–54.

<sup>45</sup> Diamond, Douglas, Dybvig Philip (1983) Bank Runs, Deposit Insurance, and Liquidity. *The Journal of Political Economy* 3 (91): 401–419.

manner, aggravating the negative consequences. On the other hand, the paper has theoretical limitations by construction. Let us discuss those to understand why tighter regulation and state deposit insurance have to be omitted. For a structured comparison of the model's setting versus implementation, please refer to Appendix II.

First, there are limitations to DD's concept implementation. DD assumed the deposit insurance to be based on a taxation principle, not a prepayment one, i.e., tax is collected after the bank default occurs, not before the default event as is in practice. Second, DD assumed the tax (payment to the deposit agency) is collected from the depositors who have withdrawn their funds earlier than scheduled. In practice, payment is collected from banks. Therefore, DD's finding is correct in assuming that when punishing early withdrawers, the bank's standing can't be worsened, because of liquidity crunch. Third, DD's paper rejects suspension of deposits, according to Selgin. The problem of suspension is that it is imposed unexpectedly. On the other hand, if it were announced in advance and if the depositor knew he might only withdraw his funds no earlier than on the scheduled contract maturity date, the suspension may not have produced the same negative effect as in 1929.

Second, there are theoretical limitations to DD's concept. The first theoretical limitation of the paper is that it does not consider the bank to default because of other risks realization, e.g., credit defaults. Bank run is the only reason for bankruptcy in DD's model. It is theoretically not clear what should be taxed to cover the bank's default costs, then, if the bankruptcy reason was not the bank run. In bank run cases, there are at least depositors with withdrawn funds to be reclaimed. The second theoretical limitation is that the model is microeconomic in nature. It offers no remedy for the crisis period when several banks default or experience bank run simultaneously. It is not clear why non-defaulted banks should cover the costs of protecting depositors of defaulted banks (except maybe for the issue of trusting the whole banking system). Therefore, the deposit insurance cannot help when a systemic crisis takes place. The Chairman of the Basel Committee also expressed this opinion in mid-2017.<sup>46</sup> The key takeaway is that state deposit insurance has to be abandoned to make banks responsible for risk taking.

One may note that similarly to state deposit insurance, credit default swaps (CDS) incentivized equivalent shifts toward more risk taking, with which came an illusory perception of lowering risk. In fact, one risk type was sub-

---

<sup>46</sup> Ingves, S. Remarks given at IADI conference on "Designing an Optimal Deposit Insurance System." 2 June 2017. URL: <http://www.bis.org/speeches/sp170602.htm>

stituted by another, e.g., credit risk against counterparty A was changed to credit risk against counterparty B. Risk did not evaporate from the entire financial system; it still resides within the system, though a feeling of its absence at the level of a solo institution may be produced.

Analysis shows that to design an optimal financial risk regulation framework, one has to decrease the supervision coverage in the number of supervised entities to result in lesser risk taking by banks, and to arrange switching responsibility to the agents, not to the principal, i.e., take responsibility from the regulator and put it back on banks, with the regulator (including the Basel Committee) playing the advisory and coordination roles. Then, bankers would desire to keep higher cushions of capital, and the capital-to-assets ratio would rise. Crises would still take place, as there is risk within the economic system, but they would become less devastating. Hence, financial stability would improve, as aimed for by Minsky.<sup>47</sup>

#### 4. Regulation outcome

When analyzing regulation outcome, one should consider the psychology of agents, including the impact of remuneration regulation practices, cost of implementation and support, intersection of regulation and competition and the ultimate responsibility for the risk level within a system.

First, one speed camera inefficiency or limitation in speed camera outcomes came from drivers' adaptation, i.e., drivers slowed down before camera spots and sped up to cover the loss of time, according to Wells. Regulation of bankers' remuneration, in essence, produces similar consequences. Avgouleas and Cullen also mention that sociopsychological phenomena are omitted from Basel regulation, though are important triggers or drivers for financial stability.<sup>48</sup> Specifically, in its current form, remuneration regulation of bankers cannot result in financial stability.

Basel III rules require bank staff, at least at the top executives' level, to be differentiated into risk-managers (risk-controllers) and risk-underwriters (risk-takers; de facto – sales managers). It is demanded that the former (risk-man-

---

<sup>47</sup> Minsky, Hayman (1982) *Can "It" Happen Again?* Routledge, New York.

<sup>48</sup> Avgouleas, Emilios, and Jay Cullen (2014) Market Discipline and EU Corporate Governance Reform in the Banking Sector: Merits, Fallacies, and Cognitive Boundaries. *Journal of Law and Society* 41(1): 28–50.



agers) have a smaller part of variable remuneration and that the latter (risk-takers) have a larger one. Therefore, regulators expect risk-managers to become more independent in risk evaluation. Both categories of regulated staff need to have their payments deferred, but in contrast to some internal investment banks' practices where the bonus pool is continually accumulated to retain staff, the risk regulation framework requires part of the remuneration to be written off in case losses were incurred on underlying transactions during the deferral period (with no obligation to pay it back later).

From one side, similar to drivers, bankers would first try to offset any losses in remuneration incurred during crises when their bonus was written off. Bankers would do so by taking more risk, inflating the economic boom, i.e., producing a procyclical effect. From another side, bankers would start to gamble even more during bad times. To trace that effect, one has to consider the agent type of risk-underwriters in terms of risk perception. If risk-managers are predominantly risk-averse, risk-underwriters are mostly risk-lovers. When one offers a risk-lover the chance to gamble or to receive fixed payment (this is exactly the case when the remuneration is deferred because now there are chances of losing part of the bonus), the risk-lover chooses to gamble.

The key takeaway here is that financial risk remuneration rules have to be changed to not stimulate excessive risk taking. It is proposed not to write off the deferred payment and not to limit risk-managers' variable remuneration parts, but to fix the payout for risk-takers (if latter are still ever needed), as financial performance depends mostly upon risk models. Risk-takers are merely users of risk models, whereas risk-managers are the ones who define the outcome and financial performance by developing models underlying the risk-taking decisions (the latter are recently more and more often associated with no risk-takers being de facto involved).

One should consider another traffic analogy when thinking about who is allowed to drive. It is not only the knowledge of driving rules, cars, geography, etc. to consider, but also the fact of being psychologically appropriate to drive. This is exactly the cause for a large debate on to what extent drinking should be allowed when driving. The underlying idea is that drunk drivers are less attentive and more aggressive and cause a larger number of accidents. Back to the above discussion of risk perception by bank managers, currently, bank managers must pass qualification exams testing their knowledge of rules. However, such qualifying criteria should include bank managers' limitations on risk perception in conjunction with limitations on drinking when driving.

Second, regulation has an economically justified limitation. The UK national speed camera program business model was based on balancing the costs of new camera installations and existing camera maintenance with the inflows from fines. The program was stopped when drivers had adapted to cameras and the income from fines had dropped, according to Wells.

Financial risk regulation also has its costs, as was discussed in Section 1. The Basel Committee stated that Basel III's impact is expected to be positive for the world economy, as the extra capital burden would be offset by the decrease in probability of the next global crisis.<sup>49</sup> Nevertheless, neither methodology nor computations were made available to the public, nor was there explicit mention with respect to how much new regulation would cost.

The probability of the next global crisis is quite disputable and mostly impossible to verify. (One should remember that although systemic risk is a popular term, it is no less artificial and non-verifiable as potential (long-run) GDP is). Here comes the contradiction. The Basel Committee itself has suggested rejecting the use of default probability models for low-default portfolios,<sup>50</sup> as the global crisis is the lowest default portfolio when modeled. At the same time, extra supervision costs (allocated to banks directly like in the ECB case<sup>51</sup>) or indirectly (through taxes, etc.) request banks to cover extra expenses and to once again take more risk in order to deliver the return promised to or requested by shareholders, according to Repullo.<sup>52</sup>

Third, when traffic flow regulation or vehicle regulation becomes tighter, either transport is abandoned or manipulation arises (consider Volkswagen's 2015 case with pollution measurement). Similarly, the increase of financial risk regulation and supervision of traditional banks shifts the competitive landscape by giving preferences to new financial intermediaries that fall out of supervision. The latter include fintech projects (quasi-banks that reside on wholesale funding and infrastructure of traditional banks, payment substitutes by cell phone operators, peer-to-peer lenders, etc.). In addition to fintechs,

---

<sup>49</sup> Wellink, Nout. 2010. "Results of the comprehensive quantitative impact study." BCBS press-release. URL: <https://www.bis.org/publ/bcbs186.htm>

<sup>50</sup> BCBS. Reducing variation in credit risk-weighted assets – constraints on the use of internal model approaches – consultative document. 24 March 2016. URL: <http://www.bis.org/bcbs/publ/d362.htm>

<sup>51</sup> Supervision fees for 2018 equaled EUR 474 m. 2018 ECB Decision on total annual supervisory fees. Article 2, p. 2. URL: <https://www.bankingsupervision.europa.eu/organisation/fees/total/html/index.en.html>

<sup>52</sup> Repullo, Rafael (2004) Capital requirements, market power, and risk-taking in banking. *Journal of Financial Intermediation* 13, 156–82.

regulators tend to differentiate capital buffers, particularly those by ICAAP. Unintentionally or deliberately, they undertake a financial protectionism policy through asymmetrically applied regulation, as defined by Young.<sup>53</sup> The key takeaway here is to decrease regulatory scope and simplify rules to equalize the competitive landscape.

Fourth, when one thinks of traffic flow regulation, any accident is mostly taken as the responsibility of the agents' mistakes or rule violations. When one considers recent financial risk regulation, it may seem that the responsibility for accidents (defaults) is being switched to regulators. The Basel Committee, therefore, becomes a sort of last resort regulator, bearing the ultimate responsibility for banking crisis prevention. There are two ways to explain this.

First, one may try to search for a bank that does not target merely meeting the prudential ratios. One may recall ICAAP. It happens that ICAAP's estimates for large banks do not drastically differ from prudential ratios (though justification may well be complicated considering diversification benefits, an increased set of risks, etc.). To the author's perception, banks have lost the capability to think in the situation when the regulator is absent, i.e., when there are no prudential ratios (as when an industrial company chooses optimal debt-to-equity ratio). Even advanced peer-to-peer lenders tend to target banking capital ratios to obtain high valuation of such lenders' business.

Second, several authors, such as Arndorfer and Minto and Penikas, put the Central Bank as the fourth line of defense.<sup>54, 55</sup> This means risk control resides within the Central Bank after it has passed salesmen or traders (first line of defense), risk-management (second line of defense) and internal auditors (third line of defense). Though banks blame the regulators for excessive regulation, banks wish for regulators to find remedies for the next crisis and to prevent it. Banks started thinking that everything suggested by regulators would work, e.g., the recovery plan as it was requested by regulators (though it cannot be tested; even in currently proposed form, it lacks the workable remedies for cross-border resolution as described by Avgouleas et al.<sup>56</sup>), or other novelties,

---

<sup>53</sup> Young, Kevin (2014) The Complex and Covert Web of Financial Protectionism. *Business and Politics* 16 (4): 579–613.

<sup>54</sup> Arndorfer, Isabella and Andrea Minto (2015) The “four lines of defence model” for financial institutions. Occasional Paper 11. Financial Stability Institute.

<sup>55</sup> Penikas, Henry (2015) History of banking regulation as developed by the Basel Committee on banking supervision in 1974–2014 (brief overview). *Financial Stability Journal* 28(5): 9–47.

<sup>56</sup> Avgouleas, Emilios, Goodhart, Charles, and Schoenmaker, Dirk (2013) Bank Resolution Plans as a catalyst for global financial reform. *Journal of Financial Stability* 9: 210–218.

as banks participated in QIS (though they inputted rough figures, not adjusting their strategy to those prudential changes). Regulators try to justify this expectation by issuing more and more new and complicated regulations. The less the new regulation is understood and manageable, the more banks think the regulator must be sure that the proposal is to work. The more often crises happen, the more regulation is issued to excuse for having allowed the crisis to happen. Thus, a vicious cycle is created. To break it, regulation has to be abandoned except in times of crisis when regulatory penetration may be justified.

There is another parallel to consider. There are some African tribes that promote using a set of necklaces for women. The number of necklaces is such that it mostly substitutes the neck's power and keeps the head straight. When such a necklace is removed, the wearer may die because of undeveloped (or more precisely, atrophied) neck muscles. Currently, regulation has tightened banks so strongly that they indeed may become dysfunctional with no support in terms of regulation. This is exactly why we need to start training our financial systems and banks not by strengthening regulations, but by relaxing them.

The key takeaway here is that regulators should stop producing new regulation and rather focus on how to simplify the existing one, as it is never able to keep the pace with banks that are faster in finding options for regulatory arbitrage. This was highlighted by Mr. Hensarling when he said that banks would always find a way to game complicated rules, so simple ones are preferable.<sup>57</sup>

## 5. Conclusion

To conclude, let us once again reconstruct the research logic. Banks do not differ at all from industrial companies, which define debt-to-equity ratio, i.e., the share of capital (equity) on their balance sheet. To ensure financial stability, one has to deal with bankers' incentives by learning from peer domain, i.e., from traffic flow regulation.

Traffic flow regulation is similar to financial risk regulation, as both are related to risk taking. Both target smoothness and safety, i.e., stability. Traffic flow regulation experience suggests that to arrive at optimal production of public bads (in traffic or in finance), absence of regulation is preferred in cer-

---

<sup>57</sup> The Economist, 25 June 2016: Regulating Banks. Capital Hill.

tain cases. Wrong or exorbitant regulation may lead to extra risk taking, which is why the optimal design of the financial risk regulation framework would have the following features.

Rules should be simplified. Developing countries should not allow advanced risk-modeling usage for prudential computation purposes until these countries are mature and developed enough. The role of the regulator has to change to coordinator and advisor. State deposit insurance has to be abandoned. Responsibility has to be brought back to banks.

These measures would result in credit boom reduction to a greater degree, rather than an appealing proposal of tightening regulation and particularly of increasing capital requirements. If financial stability is to rise, taxpayers must stop financing the downside of banking activities via bailouts and state deposit insurance.

## Appendix I. Traffic Flow Regulation Terms Mapped to Banking Domains

	Traffic Flow Area	Banking Area
<b>Risk Taking as the Principal Activity</b>		
1	When one changes car lanes on a highway, one risks crashing into a nearby car if one moves too fast or too slow.	When a banker offers a loan, he or she risks not getting it back.
<b>Goods Typology</b> (originates from the discussion by Selmier et al.) <sup>1,2</sup>		
<i>Private Bad</i>		
2	One car goes off the road	Immaterial loss is incurred by one agent
<i>Club Bad (common pool resource)</i>		
3	A car crashes at some racing competition, impacting a limited set of cars.	When depositors of a bank suffer losses
<i>Public Bad</i>		
4	When other unknown (unforeseen) road participants are affected whether in accident or in congestion	When the whole economy is trembling, affecting an unforeseen list of stakeholders (including the real economy)
<b>Regulatory Objectives</b>		
5	Minimize the number of accidents	Minimize the number of bank defaults
6	Minimize consequences of an accident	Minimize expenses given on bank default
7.	Minimize congestion	Minimize out-of-operation periods
8.	Maximize possible speed	Maximize the speed of a transaction
<b>System Elements</b>		
9	Traffic flow	Bank
10	Car	Transaction
11	Road	Product
12	Driver	Bank client (counterparty)
13	Weather	Economy
14	Other traffic participants	Other financial entities, stakeholders
15	Obstacles	Regulatory limitations
16	Crash, accident	Default, crisis, loss
17	Probability of crash	Probability of default
18	Injury in event of crash	Loss given on default
19	Congestion	Stop of transactions flow

	<b>Traffic Flow Area</b>	<b>Banking Area</b>
20	Infrastructure (junction), flow size	Proportionality criteria for internal capital adequacy assessment process (ICAAP)
21	Internal safety features	Internal risk assessment models
22	External speed cameras	Supervision tools
23	Third-party liability insurance	Deposit insurance; CDS contracts
24	Trial actions at crash	Recovery and resolution planning (RRP)
25	Bumper	(Capital, liquidity) buffer
26	Side of road	Approach to computation
27	Speed limit	Risk-weight floor
28	Traffic lights	(Credit) deal acceptance criteria

<sup>1</sup> Selmier, W. Travis and Henry Penikas, Kseniya Vasilyeva (2014) Financial Risk as a Good. *Procedia Computer Science* 31: 115–23.

<sup>2</sup> It is argued that traffic and financial risks might be private bads and public ones depending on the scale of potential losses. Such typology is needed to distinguish approaches to regulating production and consumption of different types of goods (bads). For example, financial risk production, or risk taking by a solo bank, might meet microprudential requirements of minimum capital held against those. This is a private bad perspective, which implies risks to be adequate. At the same time, due to the interconnectedness of institutions, those risks acceptable at a micro-level might produce contagion and create systemic risk. This is a public bad perspective. In opposition to the private bad perspective, it implies risks are inadequate and need to be dampened.

Source: Comparison prepared by the author.

## Appendix II. State Deposit Insurance Theoretical Model Has Been Drastically Changed Upon Implementation in Practice

No.	Criteria	Diamond and Dybvig	Implementation
1	<b>Assumptions/Model</b>		
1.1	Agents' risk perception	Risk-averse	Risk-lovers (prefer to gamble and invest in high-yielding assets, expecting government to cover losses)
1.2	Bank types	One type	Several types (i.e., more risky, more fraudulent, and less risky ones)
1.3	Cause for bank default	Only liquidity crunch (bank run) may result in bank default.	Credit and other non-liquidity risks may lead to default, as well as bank runs.
2	<b>Insurance Scheme</b>		
2.1	Insurance premium collection period	Post-default	Prior to default
2.2	Who is to pay insurance premium	Depositors who withdrew their funds early	Banks
2.3	Insurance payment amount	Total amount of lost (unwithdrawn) deposits is divided over the number of depositors who withdrew funds early.	Statistical average is computed based on historical losses observed.
3	<b>Output</b>		
3.1	Agents' behavior	Agents do not run on a bank, and they do not wish to lose their wealth when redistributing their withdrawn deposits to non-bank-runners.	Agents continue depositing funds at risky banks to gain high yield on deposits, as they are guaranteed a refund from the state, and they continue running on a bank.
3.2	Insurance budget	Balanced (no deficit)	Chronic deficit accumulates

Source: Comparison prepared by the author.



**Пеникас, Г.**

**Регулирование финансовых технологий с учетом психологии людей** [Текст] : препринт WP7/2018/01 / Г. Пеникас ; Нац. исслед. ун-т «Высшая школа экономики». – М. : Изд. дом. Высшей школы экономики, 2018. – 36 с. – (Серия WP7 «Математические методы анализа решений в экономике, бизнесе и политике»). – 11 экз. (На англ. яз.)

После кризиса 2007–2009 гг. регулирование финансовой сферы растет пропорционально высоким темпам прироста мировых фондовых индексов, притом что последние уже достигли своего исторического максимума, двукратно превысив предкризисный уровень. Такое усиление регулирования стимулирует как использование финансовых технологий для создания новых продуктов, для оптимизации регуляторной нагрузки, так и «раздувание» пузыря на фондовых рынках, усиливая нестабильность и вероятность очередного глобального кризиса. Исследование показывает, как необходимо учесть психологию людей, которые являются объектами регулирования, будучи сотрудниками финансовых организаций, и становятся получателями результатов регулирования в роли клиентов финансовых организаций. Показано, как неинтуитивная мера по отмене регулирования и отказу от государственной системы страхования вкладов позволяет повысить финансовую стабильность, поскольку способствует более консервативному и менее рискованному поведению как финансистов, так и их клиентов.

*Ключевые слова:* Базельский комитет; регуляторная спираль; регулирование; риск; дорожное движение

*Коды JEL:* G28, E58, R41

*Пеникас Генрих*, Национальный исследовательский университет «Высшая школа экономики».

**Препринты Национального исследовательского университета «Высшая школа экономики» размещаются по адресу: <http://www.hse.ru/org/hse/wp>**

*Препринт WP7/2018/01*

*Серия WP7*

Математические методы анализа решений  
в экономике, бизнесе и политике

Пеникас Генрих

**Регулирование финансовых технологий  
с учетом психологии людей**

*(на английском языке)*

Зав. редакцией оперативного выпуска *А.В. Заиченко*  
Технический редактор *Ю.Н. Петрина*

Отпечатано в типографии  
Национального исследовательского университета  
«Высшая школа экономики» с представленного оригинал-макета  
Формат 60×84  $\frac{1}{16}$ , Тираж 11 экз. Уч.-изд. л. 2,2  
Усл. печ. л. 2,1. Заказ № . Изд. № 2080

Национальный исследовательский университет  
«Высшая школа экономики»  
125319, Москва, Кочновский проезд, 3  
Типография Национального исследовательского университета  
«Высшая школа экономики»