CENTRAL CLEARING COUNTERPARTIES FOR OTC-USERS: A THEORETICAL FRAMEWORK

Methodological Limits of the Recent Macro-Prudential Initiatives

Joseph Tanega*
Andrea Savi**

Most academic analyses of the financial regulatory framework assume that clearing OTC derivatives via Central Counterparties (CCPs) represents the condicio sine qua non to mitigate the systemic risk. This Article offers a different and innovative paradigm for OTC-users. This unique model shows that (1) complexity and flexibility of OTC products leads the CCPs to adverse selection in terms of risk-pricing, and exacerbate the margin calls in volatile times; (2) a standardised regulation ossifies the financial system preventing the experimentation of new solutions and incrementing the fragility of the entire regulatory system against a high-impact event (so called "black swan"); (3) subsidizing and mutualising default losses meet the limits of the game theory, encouraging clearing members to additional risks and sub-optimal strategies. The authors intend to use these epistemological limits to criticise the mandate of clearing OTC transactions via central counterparties and, meanwhile, to characterize an efficient model of market clearing based on bilateral mechanisms.

INTRODUCTION

An over-the-counter (OTC) derivatives transaction is a contractual relationship between two or more parties whose value is determined by the fluctuations of the underlying asset.[1] During the lifetime of the contract, the parties are exposed to the counterparty credit risk consisting in the possibility that a party does not meet its contractual obligations and becomes insolvent.[2] Historically, the counterparty risk has been managed through the clearing mechanism: bilaterally, when each counterparty manages the risk of the other, or centrally through a central counterparty (CCP).[3] In the aftermath of the global financial crisis, regulatory reforms moved OTC derivatives towards central clearing in order to reduce the systemic risk in the financial markets and avoid a domino effect as in the case of Lehman Brothers' bankruptcy.[4] The legislative core of this shift towards canalization through CCPs is represented by the Basel III Capital Rules, the Dodd–Frank Act of 2010 in the United States, and the European Market Infrastructure Regulation (EMIR).[5]

Broadly speaking, a CCP is an entity set up to mitigate the counterparty credit risk and to increase the transparency in the financial markets.[6] By interposing itself among the contractual parties, the CCP assumes all their rights and duties, realising a novation of the original agreement.[7] Specifically,

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1. ROBERT W. KOLB & JAMES A. OVERDAHL, FINANCIAL DERIVATIVES 1 (3d ed. 2003).
2. CHRISTIAN LANGKAMP, CORPORATE CREDIT RISK MANAGEMENT 127 (2014).
3. JON GREGORY, CENTRAL COUNTERPARTIES: MANDATORY CLEARING AND BILATERAL MARGIN REQUIREMENTS FOR OTC DERIVATIVES 3 (2014).
4. Daniel Heller & Nicholas Vause, *Expansion of Central Clearing*, BANK FOR INT'L SETTLEMENTS Q. REV. 68 (2011).
5. GREGORY, *supra* note 3, at 5.
6. Dietrich Domanski, Leonardo Gambacorta & Cristina Picillo, *Central Clearing: Trends and Current Issues*, BANK FOR INT'L SETTLEMENTS Q. REV. 60 (2015).
7. *Id.*

the CCP isolates counterparties' obligations and concentrates counterparty risk on itself. During this process, the CCP bears no net market risk exposure, which remains with the original counterparties in the trade. The only risk incurred is the possibility of a clearing member's default, which is mitigated through the reinforcing mechanism of multilateral netting, margining, and loss mutualisation. Arguably, clearing OTC derivatives via a CCP leads to a homogenisation of the credit risk and a potential reduction of the systemic risk in the financial markets. However, in a central cleared market, contractual parties are essentially considered "equal" with the CCP acting as a guarantor for all the obligations.[8] This involves a CCP quantifying an exposure based on the potential market risk of the cleared products instead of varying the collateral levels (risk pricing) according to the balance sheet of a clearing member.[9] In this light, the process of central clearing can be seen as a new form of social contract involving critical effects and adverse incentives.[10] In particular, while in a bilateral clearing market the participants are sensitive to the credit quality of their exposure, in a central clearing market the CCPs, acting as a price-vector,[11] influence the behaviour of contractual parties and, consequently, the market participants tend to underestimate their real exposure. This practice could generate adverse selection in the assessment of exotic product prices[12] and asymmetric information.

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8. Gregory, *supra* note 3, at 155.

9. Craig Pirrong, The Economics of Clearing in Derivatives Markets: Netting, Asymmetric Information, and the Sharing of Default Risk Through a Central Counterparty 39 (Jan. 08, 2009) (unpublished manuscript), http://ssrn.com/abstract=1340660.

10. Paul Tucker, *Competition, the Pressure for Returns, and Stability, in* Stability of the Financial System: Illusion or Feasible Concept? 208 (Andreas R. Dombret & Otto Lucius eds., 2013).

11. In a decentralised system, market participants rely on a vector of private prices that are updated through the exchange of knowledge. By becoming counterparty of the derivatives transactions, CCPs drive this process of prices adjustment and affect individual expectations. *See* Herbert Gintis, *Hayek's Contribution to a Reconstruction of Economic Theory, in* Hayek and Behavioral Economics 120 (Roger Frantz & Robert Leeson eds., 2013).

12. Exotic derivatives are complex products with sophisticated payoff and specific legal status. Examples are Barrier Options, Digital Options, Mountain Range Options. *See* Mohamed Bouzoubaa & Adel Osseiran, Exotic Options and Hybrids: A Guide to Structuring, Pricing and Trading 19, 145, 167, 231 (2010).

In the view of this Article, the unintended consequence of the central clearing mechanism creates a point of friction with the principles of methodological individualism.[13] In an acceptable model of market-dynamics, every agent is a price-vector and manages the counterparty credit risk in accordance with their own knowledge.[14] An aggregate clearing mechanism could potentially distort the market order and incentivise moral hazard through loss mutualisation. According to F. A. von Hayek (1899–1992), market order (defined as "catallaxy") is a spontaneous process that allows the dissemination of the knowledge between individuals with different interests.[15] He argued that the price system, as a decentralised mechanism for transmitting information, coordinates economic activity through time.[16] Exogenous interference could falsify the pricing process and misdirect the trade cycle.[17] Thus, prescriptive regulation that forces contractual parties to clear their transactions via CCPs causes the price system to deviate and leads investors to negatively allocate their portfolio.

The purpose of this Article is to analyse the CCPs' regulatory framework, including Dodd–Frank and EMIR, starting from the epistemological premises of methodological individualism. The criticism that this work will raise is not directed against the *pure* concept of central clearing (developed in ancient Roman commercial law), but its mandatory use under recent legislative developments.

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13. Using the definition of Karl Popper, methodological individualism is a doctrine insisting that "the 'behavio[u]r' and the 'actions' of collectives, such as states or social groups, must be reduced to the behavio[u]r and to the actions of human individuals." WILLIAM A. GORTON, KARL POPPER AND THE SOCIAL SCIENCES 15 (2012) (quoting KARL POPPER, THE OPEN SOCIETY AND ITS ENEMIES 303 (Routledge Classics ed., 2011)).

14. This assumption is based on the marginal utility theory of Carl Menger. According to this theory, the value of a good is established through subjective valuation by individuals based on its usefulness to satisfy their needs (bottom-up approach). *See* Karen I. Vaughn, *The Mengerian Roots of the Austrian Revival, in* CARL MENGER AND HIS LEGACY IN ECONOMICS 380 (Bruce J. Caldwell ed., 1990).

15. FRIEDRICH A. HAYEK, LAW, LEGISLATION AND LIBERTY: A NEW STATEMENT OF THE LIBERAL PRINCIPLES OF JUSTICE AND POLITICAL ECONOMY 269 (Routledge Classics ed., 2013).

16. *Id.* at 276–77.

17. FRIEDRICH A. HAYEK, PRICES AND PRODUCTION 74 (2d ed. 1935).

Part II of this Article analyses the historical evolution of the clearing concept from Roman law to the development of the OTC derivatives market. Then, it examines the structure and function of CCPs, mainly focusing on the mechanisms of novation, multilateral netting, and margin. This Part critically evaluates the problem of margin pro-cyclicality and asymmetric information in relation to Hayek's price theory.

Part III discusses the disharmonies between EMIR and Dodd–Frank in the matter of CCP regulations as well as in the adoption of the Credit Value Adjustment ("CVA") for non-centrally cleared derivatives. OTC derivatives have an international nature and the lack of jurisdictional coordination could present conflicts in cross-border transactions. This Part also demonstrates how the mechanism of substituted compliance between E.U. and U.S. legislation potentially prevents this risk. After that, Part III highlights the limits and weaknesses of adopting a uniform regulatory framework. In particular, by preventing the diversity and the development of heterogeneous models, the regulatory system may become, paradoxically, more *fragile* and more subject to the systemic risk.

Part IV describes the scenario of a clearing member default and identifies the tools that CCPs can implement to absorb losses. Specifically, it analyses the Loss Waterfall and the Loss Allocation methods used by CCPs to distribute the default risk between clearing members. Then, the limits of the sharing mechanisms are demonstrated through the prisoner's dilemma and the stag hunt games. This exercise reveals that the absence of tools to internalise the default risk could provide an incentive for clearing members to assume a conservative approach in the auction process and to add excessive risks to their balance sheets. Finally, the position of the regulators in the low-probability situation of a CCP failure is criticised by assuming the premises of frequentist probability theory.

I.
BACKGROUND

A. *Methodology*

1. *Research Overview*

Fundamentally, the research questions of this Article emphasize a casual-genetic method to analyse the recent financial regulation on OTC central clearing counterparties. The dis-

cussion presents a comparison between the legal principles of the CCPs and the postulates of the methodological individualism. In the view of this Article, complex phenomena such as a body of law or a financial system must be interpreted by showing how they arise as the result of human actions' relations. Individuals act with limited information and different expectations.[18] This implicates the existence of a large number of variables and connections among them, preventing standardised models from operating efficiently. To investigate the extent to which the new regulation influences market prices and market strategies, this Article adopts the following ontological assumption and epistemological research.

2.   *Ontological Assumption*

The axiom of this Article is that a collective is not a *sui generis* entity but the sum of human actions. Assuming the Aristotelian nominalism, which denies the existence of abstract objects, it is possible to argue that universals (collective) exist only because the human mind perceives the natural world and designs categories (names) for all the individual objects.[19] None of these concepts, categories, or names are separate entities; they exist only in relation to determined human actions.[20] Whereby, all complex phenomena such as law, economics, and the financial system can only be understood starting from the analysis of individual behaviour.

3.   *Epistemological Research*

In point of fact, any ontological consideration involves an epistemological consequence. In this case, the reconstruction of law and economics as praxeological sciences implicates a high degree of uncertainty. According to Ludwig von Mises, uncertainty is always present in human action.[21] Since the market order is the product of endless human actions, there is an ineradicable uncertainty regarding the position that single variables may assume. This risk factor, therefore, must be ac-

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18. Hayek, *supra* note 15, at 276.
19. R. Dean Peterson, A Concise History of Christianity 157–60 (Belmont, CA: Wadsworth Publishing Company, 1999).
20. *Id.*
21. Ludwig von Mises, The Human Action: A Treatise on Economics 58 (Ludwig von Mises Institute, 1998) (1949).

cepted as an externality of the human action, putting financial regulators before the impossible task of constructing, ex ante, a probability distribution of market phenomena that follows a pattern or the characteristics of a certain class.

B.   *Theoretical Framework*

Hayek noted,

> [t]he statement that, if people know everything, they are in equilibrium is true simply because that is how we define equilibrium. The assumption of a perfect market in this sense is just another way of saying that equilibrium exists but does not get us any nearer an explanation of when and how such a state will come about. It is clear that, if we want to make the assertion that, under certain conditions, people will approach that state, we must explain by what process they will acquire the necessary knowledge. Of course, any assumption about the actual acquisition of knowledge . . . these . . . subsidiaries hypotheses . . . that people learn from experience, and about how they acquire knowledge, constitute the empirical content about what happens in the real world.[22]

Thus, the market dynamics must be analysed through a casual-genetic method that tries to reduce every complex phenomenon to individual action. According to Carl Menger, the casual-genetic analysis is methodologically individualistic and seeks not to measure but to understand (*verstehen*) economic phenomena.[23]

This assumption is the basis for the principle of the distribution of knowledge in the social orders and in the financial markets. Knowledge is dispersed throughout society and depends on particular beliefs and dispositions of countless individuals. Therefore, each market actor possesses incomplete knowledge about the variables affecting prices and potential profits ("tacit knowledge"). In this light, decentralized systems, although they will never be "perfect" in the sense of economic

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22. FRIEDRICH A. HAYEK, INDIVIDUALISM & ECONOMIC ORDER 46 (The University of Chicago Press, 1948).
23. CARL MENGER, PRINCIPLE OF ECONOMICS 47 (Ludwing von Mises Institute, 2007) (1976).

equilibria, ensure an optimization of the process of knowledge distribution in the marker order.[24]

C. *Literature Review*

In *The Wealth Of Nations*, Adam Smith (1723–1790) emphasised that the market prices are determined by the competition and the self-interested behaviour of market participants. Individuals, by pursuing their own self-interests, generate social benefits.[25]

In *Law, Legislation and Liberty*, F. A. von Hayek (1899–1992) distinguished two different types of orders: *cosmos* and *taxis*.[26] The cosmos is a spontaneous order with the following characteristics: (1) complexity—its degree of complexity is not limited to what a human mind can master; (2) abstractness—it consists in a system of abstract relations between particular elements that observe abstract properties; (3) purposiveness—it cannot have a particular purpose.[27] On the contrary, the taxis is the artificial order with the properties of simplicity, concreteness, and intentionality.[28] The system of market prices and the law fall into the cosmos. As complex and spontaneous, these systems are therefore hard to understand, hard to control, and rule-governed.

In *Price and Production* (1931), Hayek suggested the concept of asymmetric information to delineate the principal difference between a competitive market and centralised market.[29] Basically, a competitive market guarantees more information efficiency than a centralised market because it provides incentives for the individual agents to utilise and acquire the knowledge dispersed in the social order. Through the spontaneous re-distribution of the output, the market process overall realises the *Pareto Efficiency*. Contrarily, a centralised market is potentially subject to the risk of adverse selection. CCPs are also vulnerable to this risk that occurs when members trading OTC derivatives have more knowledge of the relative risk than the central counterparty.

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24. Friedrich A. Hayek, *The Use of Knowledge in Society*, 35 AMERICAN ECON. REVIEW 519–30 (1945).

25. ADAM SMITH, THE WEALTH OF NATIONS 48 (MetaLibri, 2007).

26. Hayek, *supra* note 15, at 36.

27. *Id* at 37.

28. *Id.*

29. Hayek, *supra* note 17, at 125.

Leon Walras (1834–1910) introduced the concept of the *Walrasian Auctioneer* that, in perfect competition and information conditions, determines the prices to ensure the market clearing and the achievement of general equilibrium.[30] The CCPs, by setting the prices and clearing the transactions, act as the Walrasian Auctioneer.

Nassim Nicholas Taleb introduced the concept of *antifragility*.[31] An antifragile system is able to gain from failures and volatility.[32] Exposure to stress factors improves the operation of such a system allowing it to cushion the impact of highly improbable events (called "Black Swans").[33] Therefore, by standardizing procedures and focusing mainly on how to avoid unpredictable defaults, financial regulations can make the financial system more *fragile.*

Game theory provided a new contribution to the methodological individualism.[34] It offers a comprehensive analysis of self-interested behaviour under circumstances of strategic interdependence. Multiple equilibria exist in the economy that are consistent with individuals-to-individuals interaction. An example of game theory is the "prisoner's dilemma," which assumes a certain relevance in the CCPs' context. In this game, efficient outcomes are *subjective*, since the *Nash equilibrium* does not meet the criteria for being *Pareto optimal.* Another example is the "Stag Hunt," where cooperation between individuals depends on rationality and mutual beliefs. These examples are examined more thoroughly in Sections IV.B and IV.C.

The theory of *frequency probability* defines the probability of an outcome as the limiting frequency with which that outcome appears in a long series of similar events. According to Richard von Mises (1883–1953), it is possible to speak about probability only in reference to a proper "Kollektiv."[35] A Kol-

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30. Vivienne Brown, Competitive General Equilibrium 499, http://www.cengage.co.uk/himmelweit/ch18.pdf.

31. Nassim Nicholas Taleb, Antifragile: Things That Gain from Disorder 3 (2012).

32. *Id.* at 100–02.

33. *Id.* at 14.

34. *See* John von Neumann, Oskar Morgenstern, Theory of Games and Economic Behaviour (Princeton University Press, 1953).

35. Michiel van Lambalgen, *Randomness and Foundations of Probability: Von Mises' Axiomatisation of Random Sequences*, 30 IMS Lecture Notes – Monograph Series 347, 352 (1996).

lektiv is a mathematical abstraction in which the relative frequencies tend to fix its limits and it is not possible to apply any place selection rule. Under this assumption, it is not possible to apply probability calculus to predict any single event.

Under the Basel III capital rules, cleared OTC transactions have a risk weighted of two percent due to the low estimated *probability* of default. In *The Human Action*, Ludwig von Mises (1881–1973) sundered the concept of probability into *class probability* (or frequency probability) and *causal probability*.[36] According to Mises, casual probability is only applicable to social sciences. A controversial point is whether the probability of a CCP failure is related to class or casual probability.

II.
The Concept of Clearing: Historical Perspective and Legal Principles

A. *Historical Evolution of the Concept of Clearing*

Historically, the concept of CCP clearing is a development of the Classical Roman commercial law principles of *compensatio* and *novatio*. Modestinus defined the institute of compensatio as "the mutual contribution of a debtor and a creditor."[37] It implies the existence of two mutual debts and receivables between two contractual parties, which is set off in order to avoid the performance of two separate payments. Thus, the aim of the compensatio was to avoid unnecessary payments by evaluating which party had the right of the net balance. On the other hand, novatio was intended to involve the replacement of a previous obligation with a new obligation. The novatio produces legal effects when the intention of the contractual parties to novate the original agreement (*animus novandi*)[38] exists at the same time as a new element that differentiates the original obligation from the novated obligation. This analysis highlights that the concept of clearing was born to simplify the settlement process and facilitate the fulfilment of contractual obligations. Although the fundamental principles of compensatio and novatio are unchanged, the functions of clearing

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36. Ludwing von Mises, *supra* note 21, at 107.
37. William L. Burdick, The Principles of Roman Law and Their Relation to Modern Law 539 (1938).
38. Adolf Berger, Encyclopedic Dictionary of Roman Law 600 (1953).

have undergone a radical revision due to the increasing volume of the financial market and the development of new contractual forms.

The first application of the notion of clearing emerged in the commodity market in the 19th century.[39] In fact, the principal issues with the commodity exchanges were the lack of uniformity among the traded products (e.g., variation in quality or quantity) and the risk of non-performance of the contractual obligations (e.g., non-delivery of the goods). To ensure the confidence of the market participants, financial bodies called "clearing houses" were established with the function of setting common standards of quality and quantity in the commodity market and of simplifying the administration of the settlement process between buyers and sellers.[40] A clearing house was an organisation linked directly to the relevant exchange and created to promote mutually beneficial trades by encouraging a progressive standardisation of the contracts and the clearance of the commodity transactions. Examples of notorious clearing houses were the London Produce Clearing House (currently called "LCH.Clearnet Ltd") founded in the United Kingdom in 1888, and the Board of Trade Clearing Corporation (currently called "CME Group") established in the United States in 1883.[41] In a clearing house, the mitigation of the non-performance risk was achieved through the mechanism of "clearing rings" in which groups of traders agreed to accept each other's contracts and permit the interchangeable nature of the counterparties.[42] Clearing rings can be seen as an informal tool to reduce the counterparty risk and facilitate the close-out of the open positions. The ring offered the collective benefit of guarantying the liquidity of the transactions by requiring each member to provide an appropriate margin to demonstrate their willingness to fulfil the transaction.[43] The following graph presents an illustration of the clearing ring:
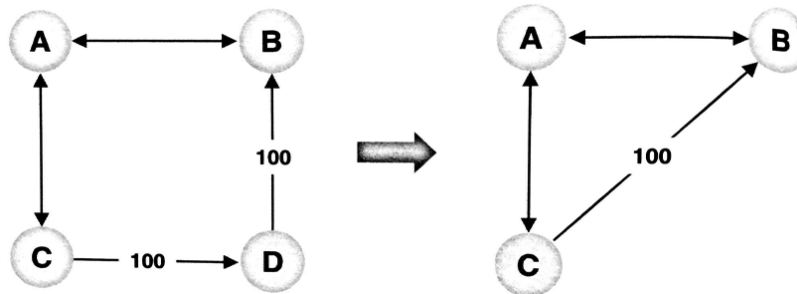
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39. Jiabin Huang, The Law and Regulation of Central Counterparties 50 (2010).

40. *Id.*

41. *Id.*

42. R. Bliss & C. Papathanassiou, Derivatives Clearing, Central Counterparties and Novation: The Economic Implications 11 (2006), https://www.ecb.europa.eu/events/pdf/conferences/ccp/BlissPapathanas siou_final.pdf.

43. Huang, *supra* note 39, at 50.

Graph 1. The obligations between C–D and D–B are replaced with one obligation between C–B.[44]

From what has been said thus far, it seems evident that the traditional role of the clearing houses consisted of making regulations regarding the clearing of trades and guaranteeing the fungibility of contracts through the mechanism of the clearing ring. In particular, clearing houses supported the diffusion of model-types of standardised derivatives agreements as futures[45] and options,[46] making the trading of a *sole* contract as an exchangeable instrument possible. According to Adam Smith, the use of clearing houses in market transactions implements the effectiveness of the "invisible hand" and further involves a significant reduction in the transaction costs.[47] In *The Wealth of Nations*, he highlighted that transaction costs are incurred in bringing together the willing of buyers and sellers.[48] Consequently, from the contractual parties' perspective, a reduction in the costs for trading, clearing, and settlement facilitates the achievement of their individual purposes. Clearing houses, through the combination of the institute of compensa-

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44. GREGORY, *supra* note 3, at 14.

45. A future is a standard derivative contract that binds two parties to purchase and sell an asset or a financial instrument at predetermined dates and prices. *See* GEOFFREY FULLER, THE LAW AND PRACTICE OF INTERNATIONAL CAPITAL MARKETS 65 (3d ed. 2012).

46. An option is a standardised agreement in which a party has either a right to purchase an asset at a fixed price, or a right to get a payment, if the value of the asset increases above or decreases below a determined price. *See id.* at 63.

47. SWX Group Annual Report, Hans Geiger, Adam Smith and the Clearinghouse 100 (2006), http://www.six-swiss-echange.com/download/about/annual_report/2006/financial_statements/geiger_en.pdf.

48. *Id.*

tion and the mutual offsetting of the transactions, can generate a substantial decrease of the transaction costs achieve mutually beneficial exchanges.

However, with the exponential growth of the OTC derivatives market at the beginning of the 1980s,[49] the process of clearing assumed a further grade of complexity and relevance. In particular, the clearing houses moved from operating as a simple administrator of the transaction to taking the positions of buyers and sellers and assuming the functions of the modern central counterparties.[50] This process was mainly due to the development of new payment instruments such as the electronic trading systems that are able to automatically match buy and sell orders at predetermined prices, bypassing human intermediaries.[51] Contrary to exchange-trade derivatives, the price of an OTC derivative (e.g., an interest rate swap[52] or credit default swap[53]) is the result of a bilateral process of negotiation between the contractual parties. The main characteristic of these types of contracts is that they can be customised according to the *individual* needs and the risk-tolerance of the end-users;[54] for instance, the opportunity to negotiate the maturity date and the frequency of the payments.[55] As a conse-

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49. Stephen G. Cecchetti, Jacob Gyntelberg & Marc Hollanders, *Central Counterparties for Over-the-Counter Derivatives*, BANK FOR INT'L SETTLEMENTS Q. REV. 45–46 (2009), http://www.bis.org/publ/qtrpdf/r_qt0909f.pdf.

50. This is confirmed by the fact that only in 1973 did the London Produce Clearing House start to operate as a CCP and changed the name to "International Commodities Clearing House." *See* HUANG, *supra* note 39, at 50.

51. Terrence Hendershott, *Electronic Trading in Financial Markets*, IT PROF., July–Aug. 2003 10, 10–12, http://faculty.haas. berkeley.edu/hender/ITpro.pdf.

52. An interest rate swap is a contract between two parties to exchange, over an agreed period, two flows of interest payments, based on a specified notional amount of principal. The most common types of interest rate swaps are "vanilla" interest rate swaps under which fixed interest rate payments are exchanged for a series of floating interest rate payments. *See* Report, European Cent. Bank, OTC Derivatives and Post-Trading Infrastructures 8 (Sept. 2009), www.ecb.europa.eu/pub/pdf/other/overthecounterderivatives2009 09en.pdf?c216e073f1b91422fce6a68624a2b152.

53. A credit default swap is an agreement in which one party (the protection buyer) makes period payments to another party (the protection seller) until the maturity date of the contract, in return for compensation in the event of default or another credit event. *See id.*

54. Cecchetti et. al., *supra* note 49, at 49.

55. GREGORY, *supra* note 3, at 16.

quence, OTC derivatives present a high grade of heterogeneity and decentralisation that makes it particularly difficult for market participants to access the relevant price-information and to evaluate with certainty the value of the open-positions. Generally, clearing of OTC derivatives has been performed bilaterally through the use of master netting agreements, collateral, and other forms of credit enhancement.[56] At the end of the 1990s, the clearing houses started to provide clearing and settlement services even for OTC derivatives, to facilitate contractual parties' management of their credit exposure.[57] This sought to help market participants reduce counterparty credit risk and benefit from the fungibility that central clearing creates. Therefore, OTC transactions are currently negotiated privately and off-exchange, then novated into a CCP on a post-trade basis.[58]

Nevertheless, the benefits of central clearing are only realised if a significant mass of OTC derivatives is shifted to the CCPs.[59] According to the Bank for International Settlements, at the end of December 2014, the notional amount of outstanding OTC derivatives contracts was $630 trillion; almost half was centrally cleared.[60] The difficulty in clearing all the transactions via CCPs can be attributed to some of the criteria that the OTC contracts must meet:[61]

- Standardisation is a key requirement in order to actualise the multilateral netting[62] and replace a transaction in the event of a clearing member's default. Customised OTC contracts (e.g. foreign exchange deriva-

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56. Christopher L. Culp, *OTC-Cleared Derivatives: Benefits, Costs, and Implications of the "Dodd-Frank Wall Street Reform and Consumer Protection Act,"* 20 J. Applied Fin. 1 (2010), http://www.rmcsinc.com/articles /OTCCleared.pdf.

57. *Id.*

58. *Id.*

59. IMF, *Making Over-the-Counter Derivatives Safer: The Role of Central Counterparties*, Global Financial Stability Report (2010).

60. Report, Bank for Int'l Settlements, Statistical Release: OTC Derivatives Statistics at the End-December 2014 1, 6 (April 2015), www.bis.org/publ/otc_hy1504.pdf.

61. *European Securities and Markets Authority Consultation Paper: Clearing Obligation Under EMIR (No.4)*, at 11 (May 11, 2015), https://www.esma. europa.eu/sites/default/files/library/2015/11/esma-2015-807_-_consultation _paper_no_4_on_the_clearing_obligation_irs_2.pdf.

62. *See supra* Section II.C.

tives), which require a specialised risk model to quantify their exposure, cannot satisfy this criterion.

- Liquidity. An OTC contract must be liquid in order to have correct and representative price information. In particular, the availability of historical price data is important for the CCPs to calculate the margin required to cover the relevant positions. Some types of OTC derivatives, which have exotic options with unusual maturities and different types of currencies, are highly speculative and quite complex to evaluate.[63]
- Volume of the market. The cleared product must have a huge tradability. If the size of the relevant product is reduced, the CCP will not be able to compensate the costs of the clearing process.[64]

Under these criteria, the derivatives transactions can be divided into the following four categories:[65] plain vanilla derivatives with standard maturities dates, plain vanilla derivatives with non-standard maturities dates, non-standard derivatives for which there are well-established pricing models, and finally, highly structured deals (exotic products). Currently, only the derivatives of the first category[66] meet the conditions for the central clearing.[67] Thus, it seems that a considerable part of OTC derivatives cannot be priced accurately by the CCPs.

B.   *The Legal Principle of Novation and Its Operation*

Novation is a legal process involving the replacement of the original contractual relationship with a new contractual relationship in which the CCP assumes all rights and obligations

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63. *10th Report of the European Union Committee on the Future Regulation of Derivatives Market: Is the EU on the Right Track?*, at 11, HL (2010).

64. Gregory, *supra* note 3, at 32.

65. John Hull, OTC Derivatives and Central Clearing: Can All Transactions Be Cleared? 11 (Apr. 2010) (unpublished manuscript), https://www.moodys.com/microsites/crc2010/papers/hull_otc.pdf.

66. Plain vanilla derivatives are the standard types of options with simple payoff and strike price. The absence of a complicate structure makes these products sufficiently standardized and liquid for the central clearing. *See* Bouzoubaa & Osseiran, *supra* note 12, at 31.

67. Gregory, *supra* note 3, at 133.

of the original counterparties.[68] It means that the CCP steps into the shoes of the contractual parties and acts as a guarantor of counterparty risk in both directions. Thus, the previous agreement between the parties ceases to exist and is substituted by two bilateral obligations that duplicate the economic position for which the parties originally contracted.[69] An example of the legal mechanism of novation is represented by the following diagram:

Before novation

A ⟷ B

After novation

A ⟷ CCP ⟷ B
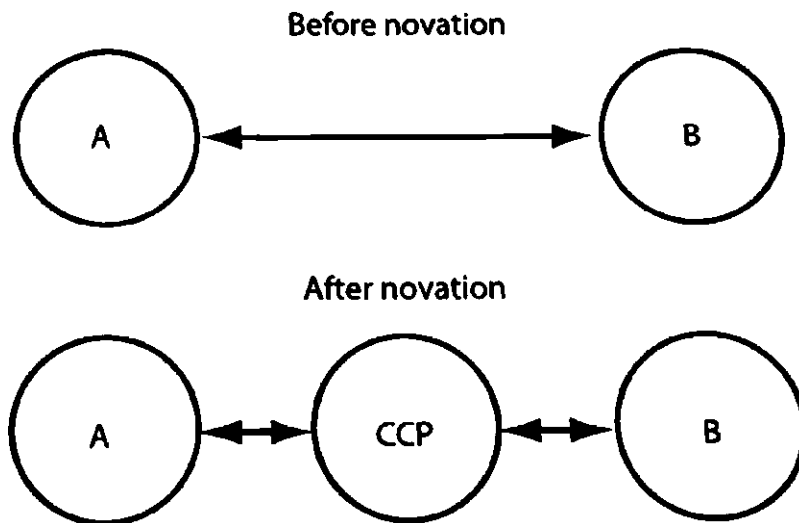
Graph 2.[70]

In this way, the CCP runs what is defined as a "matched and market neutral book."[71] Namely because the CCP becomes both a buyer and seller of the identical underlying interest, its risk position is balanced and it does not assume any market risk during the course of its business.[72] As a conse-

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68. TINA P. HASENPUNSCH, CLEARING SERVICES FOR GLOBAL MARKETS: A FRAMEWORK FOR THE FUTURE DEVELOPMENT OF THE CLEARING INDUSTRY 23 (2009).

69. 5 THE WORLD SCIENTIFIC HANDBOOK OF FUTURES MARKETS 213 (Anastasios G. Malliaris & William T. Ziemba eds., World Sci. Publ'g Co. 2015).

70. International Monetary Fund, *supra* note 59, at 8.

71. MARTIN DIEHL, ANALYZING THE ECONOMICS OF FINANCIAL MARKET INFRASTRUCTURE 255 (IGI Global 2015).

72. Amandeep Rehlon & Dan Nixon, *Central Counterparties: What Are They, Why Do They Matter and How Does the Bank Supervise Them?*, BANK OF

quence, adverse movements in market prices do not affect the balance sheet of the CCP. In fact, the only risk taken by the CCP is the counterparty credit risk, which is mitigated and managed by the CCP's members. However, to be effective, the novation is subjected to two conditions. First and foremost, the new contracts must be legally enforceable in order to discharge the original debt of the transaction to the CCP. Second, as we have already seen in the Roman conception of novatio, the parties must demonstrate the intention to novate the contract. Based on these assumptions, the moment of validity of the novation's mechanism is generally established by the rules of the market in which the CCP provides its services. Until recently, the time of novation could take several days or weeks.[73] Now, with the development of the market's straight-through processing ("STP"),[74] derivatives transactions can be conducted electronically and the novation is realised simultaneously with the stipulation of the original contract.[75] This approach is known as an "open offer"[76] and it consents to the CCP to making an unconditional offer in order to immediately substitute the contractual parties in their relevant positions with a substantial reduction in the transactional opacity in the OTC derivatives market. Therefore, the process of novation involves a considerable simplification of the parties' rights and duties during a financial transaction and centralises the contingent exposures to the members of the CCP.

C.   *The Legal Principle of Multilateral Netting: The Concept of the Monopolistic CCP and the Interoperability Between CCPs*

Multilateral netting is a key characteristic of a CCP that allows it to reduce the total net exposure in a derivatives trans-

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Eng., 2013, at 2, http://www.bankofengland.co.uk/publications/Documents/ quarterlybulletin/2013/qb1302ccpsbs.pdf.

73. Diehl, *supra* note 71, at 255.

74. The term "Straight-Through Processing" generally means an infrastructure that enables automatic payments in the trade process for capital markets. *See* Ayesha Khanna, Straight Through Processing for Financial Services 17 (2010).

75. Diehl, *supra* note 71, at 255.

76. *Id.*

action and relieve the systemic risk in the financial markets.[77] For instance, consider a bilateral market of four participants (A, B, C, and D) with a total liability of 350.[78] In this type of market, A is exposed to C by an amount of 80 and C is exposed to D by an amount of 120. A failure of C could trigger a domino effect with critical repercussions on the possible solvency of the other counterparties. The use of a CCP to clear the transaction permits multilateral netting and a consequent decrease of the total exposure to 180.[79]
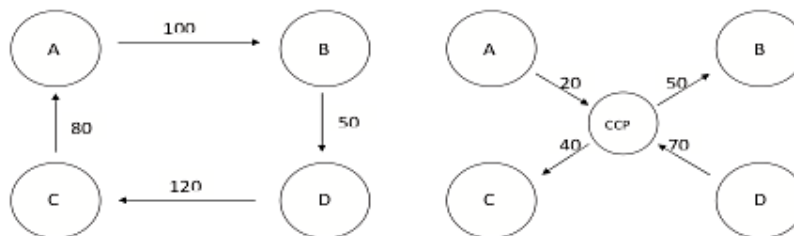
Graph 3.[80]

From the graph emerge the main advantages of multilateral netting: the elimination of redundant contracts and the simplification of the interconnections between the parties of OTC derivatives transactions. As a result, the total assets and liabilities are guaranteed by the CCP and the counterparty risk appears to be significantly reduced. However, it is necessary to say that the benefits of the multilateral netting depend on two aspects: the standardisation of the contracts and the existence of a relatively limited number of CCPs.[81] First of all, contracts must be standardised to alleviate the operational costs and in order to facilitate the close-out of the relevant positions in case

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77. JON GREGORY, COUNTERPARTY CREDIT RISK AND CREDIT VALUE ADJUSTMENT: A CONTINUING CHALLENGE FOR GLOBAL FINANCIAL MARKETS 101 (2d ed., John Wiley & Sons 2012).

78. Rama Cont & Thomas Kokholm, *Central Clearing of OTC Derivatives: Bilateral vs Multilateral Netting* 4 (2012), http://ssrn.com/abstract= 2233665.

79. *Id.*

80. *Id.*

81. Craig Pirrong, *The Economics of Central Clearing: Theory and Practice*, ISDA DISCUSSION PAPER SERIES: NUMBER ONE – MAY 2011 14–15 (2011), www2.isda.org/attachment/MzE0Ng==/ISDAdiscussion_CCP_Pirrong.pdf.

a CCP member defaults.[82] Credit default swaps (CDS)[83] are an example of a standardised product. Since 2005, financial institutions in cooperation with the International Swaps and Derivatives Association (ISDA) started a progressive standardisation of CDS maturity dates and coupons to ensure an effective offsetting of the contracts.[84] In fact, whether a dealer has several long and short CDS contracts with different counterparties but with the same maturities and terms of coupons, the dealer's position can be "compressed" and, consequently, their exposure becomes considerably reduced. According to the International Monetary Fund, multilateral netting of CDS can cut the outstanding notional amount by ninety percent.[85] This confirms that the standardisation of contracts is a central condition to realise the benefits of multilateral netting, quantified in terms of cash flow or margin payments.

With regard to the second facet, clearing the same or a different class of derivatives in multiple CCPs can create fragmentation and limit the benefits of multilateral netting.[86] The main reason is that the use of multiple CCPs increases the overall exposure in the market since exposures cleared at one CCP cannot typically be offset by exposure at a different CCP. According to Duffie and Zhu, the addition of a CCP to clear a class of derivatives (for example, CDS) involves a notable contraction of the netting efficiency and a visible increase in the cost to collateralise the relevant exposure.[87] Thus, it is more convenient to have a single CCP clearing different classes of derivatives contracts rather than a large number of CCPs clearing these classes separately.[88] An optimal solution is therefore to entrust the clearing functions to a single monopolistic CCP to provide more competitive margining costs and stronger risk

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82. GREGORY, *supra* note 3, at 71.

83. Report, Financial Stability Board, Implementing OTC Derivatives Market Reforms 15 (Oct. 25, 2010), www.fsb.org/wp-content/uploads/r_10 1025.pdf.

84. *Id.*

85. CHE SIDANIUS & FILIP ZIKES, BANK OF ENG., FINANCIAL STABILITY PAPER NO. 18, OTC DERIVATIVES REFORM AND COLLATERAL DEMAND IMPACT, at 9 (2012), www.bankofengland.co.uk/financialstability/. . ./fs_paper18.pdf.

86. GREGORY, *supra* note 3, at 71.

87. Darrell Duffie & Haoxiang Zhu, *Does a Central Clearing Counterparty Reduce Counterparty Risk?* 2 (Rock Center for Corp. Governance at Stanford Univ., Working Paper No. 46, 2011) http://ssrn.com/abstract=1348343.

88. *Id.* at 3.

management control.[89] This position is in line with Hayek's remarks on competition and monopoly.[90] In his view, competition is a spontaneous process by which individuals acquire and transmit knowledge.[91] In certain circumstances, monopoly can be an optimisation of that process since it involves a decrease of the costs and a more efficient use of the resources.[92] As for the CCP, in some market sectors, competition and excessive fragmentation can be essentially counterproductive and generate inefficiencies.

Nevertheless, the jurisdictional divergences[93] and the segregation of derivatives products[94] have created a substantial number of CCPs. For example, in the European Union, there are sixteen CCPs authorised to offer clearing services by the European Securities and Market Authority ("ESMA").[95] This fragmentation leads to a demand for *interoperability* arrangements between different CCPs.[96] Interoperability linkages between two CCPs consent to a member of CCP1 to centrally clear trades with a member of CCP2 without having any legal relationship with CCP2. The advantage of interoperability is to avoid the loss of multilateral netting. In fact, a link between CCPs allows clearing members to close out their position with

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89. Gregory, *supra* note 3, at 239.

90. *See* Hayek, *supra* note 15, at 404–33.

91. *Id.*

92. To be specific, Hayek criticises the Walrasian model of perfect competition. In his opinion, the perfect competition represents an ideal, a theoretical case which in practice does not exist, except in some economic sectors. He considered meaningless to evaluate the results of the competition process by an *a priori* quantification of the potential costs, since the costs are not objectively ascertainable but are based on the opinion and forecast of market participants. For this reason, when the monopoly is the result of the market's spontaneous processes must not be considered a privilege but a positive consequence of the competition itself. *See id.*

93. In most cases, national regulators in fact require banks and traders to clear their transactions in local CCPs. *See* Gregory, *supra* note 3, at 35.

94. CCPs generally can offer clearing services for specific types of products, such as credit default swaps or interest rate swaps (standardised products). Consequently, a significant number of OTC derivatives are non-clearable. *See id.*

95. *European Securities and Markets Authority List of Central Counterparties Authorised To Offer Services and Activities in the Union* (Sept. 19, 2016), https://www.esma.europa.eu/sites/default/files/library/ccps_authorised_under_emir.pdf.

96. *See* Gregory, *supra* note 3, at 35.

another CCP and stem legal barriers imposed by regulatory bodies to stimulate the clearing in the regional CCPs. Furthermore, full interoperability involves lower operational costs and the possibility for market participants to access a network of different CCPs without additional membership costs, such as fees and supplementary margin requirements. This interoperability is achieved by the novation of the original contract into three contracts:[97] (1) a contract between the buyer and their CCP; (2) a contract between the seller and their CCP; and (3) a contract between the two CCPs.

Respectively, the failure of a CCP to satisfy its contractual obligations must be fulfilled by the non-defaulting CCP. This clearly implies negative effects in contributing to the financial system's susceptibility to the domino effect and possible friction between different bankruptcy regimes. In addition, an important problem for linked CCPs is the evaluation of their net exposure. While the credit risk of a member can be more easily quantified, the assessment of the exposure of another CCP can be particularly complex, especially with regard to information collecting. This informational asymmetry could cause undercollateralisation of the position of one CCP,[98] with serious implications in case of market volatility. As a result, interoperability, although an efficient tool to realise the multilateral netting in a context of multiple CCPs, involves several unintended consequences that potentially increase the systemic risk. The idea that a monopolistic CCP can better ensure netting services and reduce the overall exposure seems acceptable.

D.   *The Legal Principle of Margining: The Unintended Consequences of the Variation Margin and the Initial Margin*

As already mentioned above, when a CCP sits between buyers and sellers, it has a "matched book" with no direct exposure to changes in market conditions and price fluctuations of cleared contracts. In fact, any losses incurred by one party

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97. Nicholas Garvin, *Central Counterparty Interoperability*, RESERVE BANK OF AUSTL. BULLETIN, June 2012, at 61, www.rba.gov.au/publications/bulletin/2012/jun/pdf/bu-0612-7.pdf.

98. JÜRG MÄGERLE & THOMAS Nellen, *Interoperability Between Central Counterparties* 15 (Swiss Nat'l Bank, Working Paper, Aug. 2011), http://www.snb.ch/n/mmr/reference/working_paper_2011_12/source/working_paper_2011_12.n.pdf.

are respectively matched to the gains obtained by the counterparty. However, this mechanism has an indirect vulnerability because the default of a counterparty would preclude a CCP from collecting the full amount of any valuation gains with the counterparty. At the same time, the CCP must continue to correspond the mutual payment owed to non-defaulting counterparties. To mitigate the counterparty default risk, the CCP can collect collateral through the variation margin and the initial margin.[99]

The variation margin is a frequent adjustment for daily changes in the market value of the cleared contracts.[100] Essentially, the CCP requires additional collateral from counterparties whose contracts have lost value and transfers it to counterparties whose contracts have gained value.[101] For this reason, the variation margin does not have an intrinsic cost and can be defined as a "zero-sum game."[102] In general, the frequency of margin calls is daily and the margin must be provided only in cash.[103] Nevertheless, it may happen that during volatile market periods with significant price movement, the CCP is forced to ask for intraday margin calls. There are three different types of intraday margin:[104]

- The first type is the "routine intraday margin."[105] It is calculated based on the updated market prices and positions, and it is called at pre-determined times during the day.
- The second type is the "non-routine intraday margin." It occurs when market prices vary quickly and sud-

99. Daniel Heller & Nicholas Vause, *Collateral Requirements for Mandatory Central Clearing of Over-the-Counter Derivatives* 2 (Bank for Int'l Settlements, Working Paper No. 373, 2012), http://www.bis.org /publ/work373.pdf.

100. Hester Peirce, *Derivatives Clearinghouses: Clearing the Way to Failure*, 64 Clev. St. L. Rev. 589, 607 (2016), http://engagedscholarship .csuohio.edu/ clevstlrev/vol64/iss3/8.

101. Heller & Vause, *supra* note 99, at 3.

102. Froukelein Wendt, *Intraday Margining of Central Counterparties: EU Practice and Theoretical Evaluation of Benefits and Costs* 6 (De Nederlandsche Bank, Working Paper No. 107, July 2006), https://www.dnb.nl/ binaries/ Working%20Paper%20No%20107-2006_tcm46-146764.pdf.

103. Letter from Daniel Tarullo to Bd. of Governors of the Fed. Reserve Sys. (Oct. 21, 2015), https://www.federalreserve.gov/aboutthefed/board meetings/swap-margin-board-memo-20151030.pdf.

104. Wendt, *supra* note 102, at 7.

105. *Id.*

denly.[106] In this case, the amount of margin depends on the prices (sometimes not even the positions) updated since the end of the last day.

• The third type is the "selective margin call." It is made when the losses of a clearing member's positions have reached a specific threshold.[107] Even this call is based on both updated prices and positions.

Clearly, the ratio of the intraday calls is to offer timely protection against the presumable default of a clearing member, and to mitigate the counterparty credit risk in times of high market volatility. However, this involves an increase in cost for the CCPs since they must invest in an operating system capable of quantifying the intraday prices and positions.[108] Furthermore, an unintended consequence of intraday margin calls, and more generally of variation margin calls, is the potential increment of liquidity risk[109] in the financial markets. In fact, profound changes in the prices of OTC contracts may trigger a sequence of margin calls, as in the 1987 crash.[110] On October 19–20, 1987, the clearing house of Chicago Futures Market called $4 billion in variation margin to compensate for the decline of the derivatives contracts' prices.[111] This entailed a liquidity drain from the financial system and the overdraft of the clearing members' account.[112] Thus, an exacerbation of the variation and intraday margin calls may transform the counterparty risk into a liquidity risk for the financial system.

With regard to the initial margin, it is an additional margin designed to cover CCPs in the event of a clearing member's default.[113] Contrary to the variation margin, it aims to protect the CCPs against not actual, but future losses of the

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106. *Id.*

107. *Id.* at 7–8.

108. *Id.* at 12.

109. The market liquidity risk is the risk that market participants are unable to trade securities at the best prices and liquidate the relevant positions with immediacy. *See* Kleopatra Nikolaou, *Liquidity (Risk) Concepts Definitions and Interactions* 18 (Eur. Cent. Bank, Working Paper No. 1008), https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1008.pdf?e87aba3a52137adea91048bf54801968.

110. Ben S. Bernanke, *Clearing and Settlement During the Crash*, 3 REV. FIN. STUD. 147 (1990).

111. *Id.*

112. *Id.*

113. Peirce, *supra* note 100, at 604–05.

open transactions. To be specific, in the event of a clearing member's default, a CCP is exposed to the market risk for the period between the last variation margin payment of the defaulting party and the close-out of the relevant positions. This period of time is called the "margin period of risk" ("MPOR")[114] and basically represents the time necessary to liquidate the default portfolio and re-hedge the positions through, for example, the auction process. For exchange trade derivatives, the MPOR is usually two days in European Union and one day in the United States.[115] Instead, for OTC contracts, the liquidation period is at least five business days both in the European Union and in the United States.[116] The function of the initial margin is to cover ninety-nine percent of derivatives prices' alteration during the MPOR.[117] Suitable collateral for the initial margin is wider than for the variation margin and includes non-cash securities, such as gold, government bonds, corporate bonds, investment funds backed by sovereign bonds, and some listed equities.[118] A complex aspect of the initial margin is its method of calculation. According to Hedegaard, the initial margin is primarily proportional to the levels of *market volatility*.[119] As a consequence, a CCP is inclined to raise margins in periods of high volatility and decrease it in times of financial stability.[120] Additionally, other variables affecting the initial margin are the *tail risk* and the *dependency* between asset classes in a CCP.[121] The former consists of the

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114. *European Securities and Markets Authority Final Report: Review of Article 26 of RTS No 153/2013 With Respect to MPOR for Client Accounts*, at 4–5 (Apr. 4, 2016), https://www.esma.europa.eu/sites/default/files/library/2016-429_final_report_review_of_article_26_of_rts_no_153-2013_with_respect_to_mpor_for_client_accounts.pdf.

115. *See* Supplementing Regulation 648/2012, of the European Parliament and of the Council of 4 July 2012 with regard to regulatory technical standards on requirements for central counterparties, art. 26, 2012 O.J. (L 52) 41 [hereinafter EMIR].

116. *Id.*

117. John C. Hull, Risk Management and Financial Institutions 390 (4th ed. 2015).

118. Tarullo, *supra* note 103, at 1.

119. Esben Hedegaard, Causes and Consequences of Margin Level in Futures Markets 21–23 (Feb. 28, 2014) (unpublished manuscript), https://www.aqr.com/~/media/files/papers/aqr-causes-and-consequences-of-margin-levels-in-futures-markets.pdf.

120. *Id.* at 3.

121. Gregory, *supra* note 3, at 155.

risk that an asset or a portfolio of assets varies more than three standard deviations from its current price.[122] The latter is based on the idea that if the portfolio's assets prices are relatively low-correlated, obviously the portfolio will be less risky and a CCP will need less of a margin to cover the positions.[123]

Based on these assumptions, it is clear that the valuation of the initial margin is more *subjective* than the variation margin and thus, more complex to quantify precisely. CCPs, in fact, can choose their own initial margin methodologies. For instance, LCH.Clearnet adopted the Expected Shortfall ("ES") method that is based on five years (Exchange Traded) or ten years (OTC) of historical market data to assess variations in portfolio value.[124] This method can be described as a function of two parameters: N, namely the time horizon expressed in days, and $X\%$ that represents the confidence level. The expected shortfall is the average amount that is lost over an N period, assuming that the loss is greater than the confidence level. Thus, the amount of initial margin depends on a potential loss over a certain period of time. Alternatively, CME Clearing[125] adopted the Value at Risk ("VaR") method with a 99.7% confidence level and five years of historical market data.[126] The operation of the VaR is largely similar to the ES.[127] The main difference is that the VaR is not a subadditive measure; therefore a diversification of the assets does not implicate an automatic reduction of the risks. For this reason, it has been argued that the VaR is a less coherent risk measure and it is not able, particularly in volatile times, to give information about the extreme loss that a CCP could suffer (tail risk).[128] The Basel Committee recommended a move from the VaR to the ES measure in order to accurately calibrate the size and the loss probability above a certain confidence level.[129]

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122. *Id.*

123. *Id.*

124. *PAIRS,* LCH.com, http://www.lch.com/risk-collateral-management/margin-methodology/pairs?inheritRedirect=true (last visited July 11, 2016).

125. The Chicago clearing house. *See supra* Section II.A.

126. CME Group, Cleared OTC Financial Products 20, http:// www.cmegroup.com/trading/otc/files/cleared-otc-financial-products.pdf (last visited July 8, 2016).

127. In fact, the ES is sometimes even called a "conditional VaR."

128. Basel Committee on Banking Supervision, Fundamental Review of the Trading Book: A Revised Market Risk Framework 3 (2013).

129. *Id.*

The initial margin involves two types of problems which can be analysed in comparison with Hayek's conception of market prices: (1) the issue of margin *pro-cyclicality* and (2) the related question of the *asymmetric information.* In the Principles for Financial Market Infrastructure ("PFMI"), pro-cyclicality refers to "the changes in risk management requirements or practices that are positively correlated with business or credit cycle fluctuations and that may cause or exacerbate financial instability."[130] As mentioned in the previous paragraph, the alignment of the initial margin to volatility determines an increase of the margin requirements during stressed periods. The consequence of this linkage is that investors will be encouraged to take higher levels of leverage in times of low volatility and, correspondingly, to deleverage their positions in times of intense volatility to meet the margin calls of the CCP.[131] This practice originates a pro-cyclical effect in the financial markets with a potential distortion of the market prices. In particular, the clearing members and their clients, being exposed to sudden and unexpected fluctuations of their collateral obligations, could be conducted to adversely allocate their portfolio's assets. The following examples are helpful for understanding the mechanism of margin pro-cyclicality.

On January 15, 2015, the Swiss National Bank unpegged the Swiss franc ("CHF") from the Euro.[132] This resulted in a huge appreciation of the CHF versus the Euro (see Graph 4) and in a contemporary decline of the European cash equity products.

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130. Committee on Payment and Settlement System, Principles for Financial Market Infrastructures 178 (2012).

131. Nicole Abruzzo & Yang-Ho Park, *An Empirical Analysis of Futures Margin Changes: Determinants and Policy Implications*, 49 J. Fin. Serv. Res. 65–66 (2016).

132. European Systemic Risk Board, ESRB Report on the Efficiency of Margining Requirements to Limit Pro-Cyclicality and the Need to Define Additional Intervention Capacity in this Area 15 (2015), www. esrb.europa.eu/pub/pdf/other/150729_report_pro-cyclicality.en.pdf?52420 a9b7facbeffd8df67c70d6d9e3e.
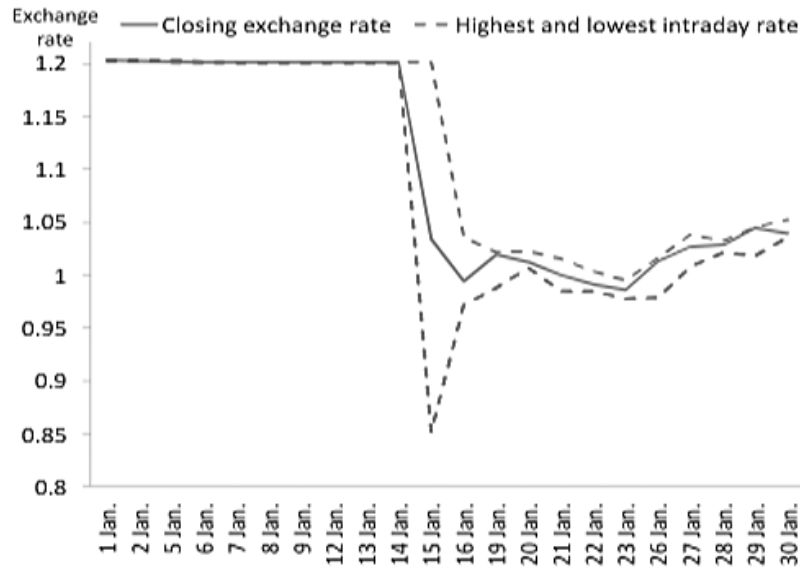
Source: Bloomberg

EUR/CHF exchange rate (2015), Graph 4.[133]

The consequent increase in trading activities involved an increment of the aggregate margin requirements, with a substantial liquidity drying up from CME Group. For some derivatives products the initial margin percentages increased significantly, sometimes twofold.[134] The following tables highlight the effect that "Brexit" had on the initial margin of 10Y par vanilla swaps in EUR, GBP and USD between June 23 and July 4, 2016:[135]

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133. *Id.* at 16.

134. *Id.*

135. Amir Khwaja, *Higher Swap Margins After Brexit*, Clarus Financial Technology, Jul. 5, 2016, www.clarusft.com/higher-swap-margins-after-brexit.

IRS 10Y 100m	Par	DV01 (k)	LCH IM (m)	CME IM (m)
EUR Pay	0.33%	95	2.9	2.6
EUR Rec	0.33%	-95	3.0	3.0
GBP Pay	0.97%	92	4.0	3.8
GBP Rec	0.97%	-92	3.7	3.5
USD Pay	1.39%	95	4.6	3.0
USD Rec	1.39%	-95	4.1	3.7

Table 1.[136]

IRS 10Y 100m	Par	DV01 (k)	LCH IM (m)	CME IM (m)
EUR Pay	0.54%	94	2.8	2.6
EUR Rec	0.54%	-94	2.9	3.0
GBP Pay	1.46%	90	3.3	2.5
GBP Rec	1.46%	-90	3.4	2.8
USD Pay	1.62%	92	4.4	2.9
USD Rec	1.62%	-92	4.0	3.7

Table 2.[137]

The tables show that the GBP Pay fixed rates decreased by –forty-nine basis points and, at the same time, the initial margin increased by twenty-one percent at LCH and by fifty-two percent at CME.[138]

From this analysis, it becomes clear that the margin pro-cyclicality distorts market dynamics and may lead investors to over-collateralise their positions in periods of market uncertainty. A first cause of pro-cyclicality lies in the criteria used to calculate the initial margin. In fact, the margin requirements are usually insensitive to the credit quality of the clearing members and are based on price models (ES, VaR) to assess the market risk. Under this aspect, all members of the CCP are treated *equally* without taking into account the specific balance sheet risk of each member.[139] Thus, two members with the same portfolio of cleared products will update the same

136. *Id.*
137. *Id.*
138. *Id.*
139. Pirrong, *supra* note 9, at 39.

amount of collateral, although their balance sheets present different risk profiles. According to Glasserman, Moallemi, and Yuan, the initial margin requirement should be convex and super-linear to the overall size of a member's position.[140] They argued that a dealer could have similar exposure in other CCPs, and if the dealer goes bankrupt, all CCPs might need to close out all their positions at the same time.[141] To avoid under-margin issues, a CCP should calculate the margin requirements according to the overall position of the dealer. However, monitoring the entire member's balance sheet would involve extra costs for a CCP and would limit its competitiveness against other CCPs.

A further factor inherent to pro-cyclicality is the problem of asymmetric information. To realise a correct quantification of the initial margin, the CCPs must have precise information on the price trend of the cleared contracts. Incorrect information about the real price of a product can lead to the CCPs suffering huge losses in stressed times. While for standardised and homogeneous products, a CCP is able to collect suitable information, in the case of exotic products, obtaining actual market price information is often difficult. The reason is that an exotic product is tailor-made to the specific risk of the end-user and it has a complex payment system based on the satisfaction of certain conditions.[142] According to Pirrong, big dealer firms have a higher degree of specialisation and more advanced risk-models to evaluate these instruments than do CCPs.[143] Specifically, a CCP's member has an *individual* interest in developing a more efficient risk-pricing model, since it means they can make a profit from trading the contract. On the contrary, the CCP, having zero net exposure in the transaction, would not receive an extra profit from developing a better information system.[144] This status of asymmetric information between the CCP and its members implies potential

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140. Paul Glasserman, Ciamac C. Moallemi & Kai Yuan, *Hidden Illiquidity with Multiple Central Counterparties* 2 (Office of Fin. Research, Working Paper No. 15-07, 2015), https://www0.gsb.columbia.edu/faculty/pglasserman / Other/OFRhidden.pdf.

141. *Id.*

142. Raffaele Scalcione, The Derivatives Revolution: A Trapped Innovation and a Blueprint for Regulatory Reform 16 (2011).

143. Pirrong, *supra* note 9, at 15.

144. *Id.*

adverse selection in the calibration of the correct value of dealer exposures. As a consequence, CCPs could be forced to modify their initial position of margin equilibrium and alter the market prices.

These considerations are mirrored in Hayek's price system theory. In his view, the price system is a mechanism for communicating information.[145] It allows for the circulation of private information among individuals and for an efficient allocation of the investments. This system, as spontaneous, works through the *principle of feedback*.[146] Namely, the variation of prices represents a signal, a vector that addresses the individual expectations towards a higher degree of convergence. In other words, the actual prices are indicators of future prices.[147] Market participants, observing the prices, can allocate their resources appropriately with their respective and individual interests. Nevertheless, in a central clearing market, the initial margin can interfere with the feedback mechanism. Exacerbating margin calls causes asset sales in other markets, drives down prices, and distorts the trading dynamics.

In this light, the CCPs' margin setting cannot be adapted to the concept of Hayek's market order. In particular, the market order, being a wealth-creating game and not a zero-sum game, assumes that market participants act to achieve *individual* profit.[148] Since a CCP is an intermediary for a group of dealers, developing a more accurate price model would generate benefits for all its members *collectively* but not *individually*. As Pirrong argues, "[c]ollective action problems can weaken the incentive of the CCP to develop a better model"[149] and therefore, it is highly likely that—for exotic products—clearing members have more information than CCPs. Inherently, it is possible to deduce that the CCPs are in the market in a situation of "epistemological uncertainty." That is, they lack the knowledge necessary to construct adequate probability measures. This position will be further confirmed in Part III.

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145. HAYEK, *supra* note 15, at 275.

146. *Id.* at 255.

147. *Id.* at 276.

148. *Id.* at 275.

149. Pirrong, *supra* note 9, at 36.

III.

A Collectivist Approach: EMIR and Dodd–Frank

The cornerstone of mandatory central counterparty clearing has its legal basis on three macro-prudential initiatives: the Basel III rules, the Dodd–Frank Act in the United States, and EMIR in the European Union. Fundamentally, these regulations start from the premise that coordination and uniformity between legal systems is necessary to pursue the public interest in financial stability. In substance, there is a close alignment between the U.S. regime and the European regime in the implementation of the central clearing mandate. Both regulatory systems have adopted a prescriptive rule-based approach and have entrusted administrative bodies to determine the scope of the clearing obligation.[150] Nevertheless, there are some procedural differences which could lead to possible arbitrage, especially in relation to the implementation of the Basel CVA charge for non-centrally cleared transactions.

A.   *EMIR and Dodd–Frank: Disharmonies Between the E.U. Regime and the U.S. Regime*

The first divergence between EMIR and Title VII of the Dodd–Frank Act regards the scope of the notion of OTC derivatives. EMIR defines OTC derivatives precisely and includes interest rate, commodity, equity, and credit linked swaps as set out in Section (C) Annex 1 of MiFID.[151] On the contrary, the definition in the Dodd–Frank is more opaque and less specific. Under Section 721(a) a swap is defined as "any agreement, contract or transaction . . . that provides for any . . . payment . . . that is dependent on the occurrence of an event or contingency associated with a potential financial, economic,

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150. In the United States, the agencies in charge of determining whether a swap or a security-based swap is subject to mandatory clearing are the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC) respectively. In the European Union, this task is instead entrusted to the European Securities and Markets Authority (ESMA). *See* Sean J. Griffith, *Substituted Compliance and Systemic Risk: How to Make a Global Market in Derivatives Regulation*, 98 Minn. L. Rev. 1291, 1317–21 (2014).

151. *See* EMIR, *supra* note 96, arts. 2(5), (7); Council Directive 2004/39/EC, § C, 2004 O.J. L 145/42.

or commercial consequence."[152] Differing from the European directive, this definition could generate interpretative problems regarding the potential inclusion under the scope of the norm of insurance contracts[153] with the risk that counterparties stem from the clearing obligation by using substantially and economically equivalent insurance agreements rather than OTC derivatives.[154] For this reason, the Dodd–Frank Act establishes a "non-exclusive insurance safe harbour"[155] to avoid contracts that are regulated as insurance being treated as swaps.[156] An agreement falls under the safe harbour if the existence of an "insurable interest" throughout the duration of the transaction is demonstrated.[157] However, this separation between insurance contracts and swaps could create uncertainty in the case of cross-border agreements.[158] Specifically, several European jurisdictions do not require proof of insurable interest in certain types of international insurance transactions (e.g., life settlements), with the conse-

152. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 721(a), 124 Stat. 1376, 1666 (2010).

153. John D. Luettringhaus, *Regulating Over-the-Counter Derivatives in the European Union – Transatlantic (Dis)Harmony after EMIR and Dodd-Frank: The Impact on (Re)Insurance Companies and Occupational Pension Funds*, 18 COLUM. J. EUR. L. ONLINE 19, 27 (2012).

154. *Id.*

155. A "non-exclusive safe harbour" means that an agreement that fails the relative insurance test is not necessarily a swap contract. In fact, it is subject to a further analysis of the relevant circumstances and applicable facts. *See* MAYER BROWN, NEW DODD-FRANK RULES REGARDING SWAPS, THE INSURANCE SAFE HARBOR AND COMMODITY POOLS: IMPLICATIONS FOR CAT BONDS, SIDECARS, ILWs AND OTHER INSURANCE-LINKED SECURITIES 40 (2012), https://www.mayerbrown.com/files/Event/1a934605-19c1-45d7-8ba5-f4943d0497cc/Presentation/EventAttachment/ab6a99d4-6794-4046-bf81-5f664a6d7f2b/Dodd-Frank_Insurance_vs%20_Swaps_November_15_FINAL.pdf.

156. Luettringhaus, *supra* note 153, at 27.

157. In particular, the insurance safe harbour has four components: a product test, a provider test, an enumerated products test, and a grandfather clause. In order to can consider an agreement as an insurance contract, it must fulfil both the product and provider test. The latter is based on the demonstration of the presence of an insurable interest. The former is satisfied if the contract is provided by a person subject to the supervision of the insurance commissioner and it is regulated as insurance under the domestic law. *See* MAYER BROWN, *supra* note 136, at 31–34.

158. Luettringhaus, *supra* note 134, at 27.

quent risk of not meeting the U.S. law criteria in order to be considered insurance contracts.[159]

A second decisive difference is related to the client clearing models adopted by the two legislations: in the United States, the agency model is predominant, whereas in the European Union, the principal model is largely preferred.[160] Under the agency model, a clearing member acts as an intermediary and guarantor of the client's obligations.[161] In this way, the clearing member does not become a counterparty of the transaction but only facilities the margin transfer between the CCP and the end-user. In the principal model, the clearing member acts as a principal of the transaction with the client.[162] In turn, the CCP acts as a principal of the transaction with the clearing member, which becomes, effectively, a counterparty to both transactions.[163] From a legal perspective, the divergence between these two models is that the agency model has a statutory and regulatory nature, since the CCP's rules determine the collateral arrangements, the relative documentation, and the settlement process.[164] On the contrary, the principal model is based on the contractual relationship between the parties, which have more flexibility to affect the clearing process in terms of margins and documentation.[165] Another significant difference concerns the exemption of certain types of products and counterparties from the clearing mandate. The U.S. Treasury has exempted FX forwards[166] and

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159. *Id.*

160. LINKLATERS, CLIENT CLEARING OF DERIVATIVES IN EUROPE – A CLIENT'S PERSPECTIVE 5 (2014), http://www.linklaters.com/pdfs/mkt/lisbon /Newsletter_Client_Clearing.pdf.

161. LINKLATERS, A FORK IN THE ROAD 37 (2012), www.linklaters .com/pdfs/mkt/newyork/A14690984.pdf.

162. *Id.* at 39.

163. *Id.*

164. *Id.* at 37.

165. *Id.*

166. An FX forward is a contract in which parties agree to exchange different currencies on a specific future date and at a fixed rate. *See* Foreign Exchange Committee, FXC Committee Letter in Response to the Treasury Department's Request for Comment on Determination of Foreign Exchange Swaps and Forwards (November 29, 2010), https://www.newyorkfed .org/medialibrary/microsites/fxc/files/2010/FXC_Letter_113010.pdf.

FX swaps[167] (collectively called "Deliverable FX Trades") from the mandatory clearing mandate of Dodd–Frank in order to avoid an excessive increment of the costs for the end-users and an adverse effect on U.S. business.[168] However, under EMIR, no absolute exemptions for specific categories of products are provided. Recital 19 of EMIR merely says that ESMA "*may* distinguish certain classes of OTC derivative contracts (such as foreign exchange) from other classes,"[169] where the risk of the transaction is predominantly related to the settlement risk rather than the counterparty risk.[170] From an OTC investor's perspective, this means that if a Deliverable FX trade is subject to both E.U. and U.S. regulatory regimes, a separate netting set and margin deliveries requirements would be necessary, with additional costs and inherent risks.[171] Legally, parties need a different margin documentation (Credit Support Annex) to account for the FX transaction in order to be compliant with the U.S. regulation.[172]

With regard to the exemption for certain counterparties, article 10 of EMIR declares that where a position of a non-financial counterparty does not exceed the relevant clearing threshold,[173] it is exempted from the clearing mandate.[174] In

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167. An FX swap is an agreement where two parties simultaneously borrow and lend one currency between them by using their repayment obligations as collateral. *See id.*

168. SHEARMAN & STERLING, DODD-FRANK: TREASURY EXEMPTS FX SWAPS AND FX FORWARDS 1 (2012), http://www.shearman.com/~/media/Files / NewsInsights/Publications/2012/12/DoddFrank—Treasury-Exempts-FX-Swaps-and-FX-Forw__/Files/View-full-memo-Dodd-Frank—Treasury-Exempts-FX-S__/FileAttachment/FinalDeterminationtoExcludeFXSwapsand ForwardsDSP__.pdf.

169. EMIR, *supra* note 115, recital 19 (emphasis added).

170. *Id.*

171. LINKLATERS, MARGIN REQUIREMENTS: COMPARISON OF THE UNITED STATES, EUROPEAN UNION AND HONG KONG MARGIN REQUIREMENTS FOR NON-CLEARED DERIVATIVES 7 (2016), http://www.linklaters.com/pdfs/mkt/newy-ork/A31678415%20Client%20Note__US%20EU%20HK%20Global%20Mar gin%20Requirements.pdf.

172. *Id.*

173. The clearing thresholds are _1 billion (in gross notional value) for credit derivative contracts and equity derivative contracts, _3 billion for interest rate, foreign exchange and commodity derivative contracts. *See* EUROPEAN SECURITIES AND MARKETS AUTHORITY, NON-FINANCIAL COUNTERPARTIES (NFCS) 1 (2016), https://www.esma.europa.eu/regulation/post-trading/non-financial-counterparties-nfcs.

174. EMIR, *supra* note 115, art. 10.

addition, articles 3 and 4(2) lay down the exemption for both financial and non-financial counterparties in the case of intra-group transactions.[175] These consist of transactions among counterparties "included in the same consolidation on a full basis"[176] and "subject to an appropriate centralised risk evaluation, measurement and control procedures."[177] Moreover, a third exception is provided for pension funds. Under article 89(1), pension schemes benefit from a temporary exclusion (currently until August 16, 2017) from the clearing mandate for OTC derivatives that allow a substantial reduction of their investment risk.[178] This provision is strictly based on the awareness of the importance of pension funds for the stability of the European financial market. The ratio of the norm is to avoid sudden assets disinvestment by the pension funds to meet the margin calls of the CCPs. Contrarily, under Dodd–Frank, an exemption from the clearing mandate is provided only for transactions with a "commercial end user."[179] To meet this criterion, the end user must not be a financial entity, must use swaps to hedge or mitigate the commercial risk, and must inform regulatory bodies on how their financial obligations are met with respect to non-cleared swaps.[180] Since pension funds are generally considered a "financial entity," they are not eligible for the commercial end user exemption. On the surface, this prospect appears to demonstrate a significant lack of coordination between the two regimes

B. *The Basel Credit Value Adjustment Charge: Disharmonies Between the E.U. Regime and the U.S. Regime*

The Credit Value Adjustment charge is a new parameter implemented by the Basel Committee on Banking Supervision to make financial institutions more sensitive to the systemic

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175. *See id.* arts. 3, 4(2).

176. *Id.* art. 3.

177. *Id.*

178. Financial Conduct Authority, List of Pension Scheme Arrangements Exempted from the Clearing Obligation (2016), https://www.fca.org.uk/publication/pension-arrangements-exempt-from-clearing-obligation.pdf.

179. 7 U.S.C. §2(h) (1936), *amended by* Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 723, 124 Stat. 1376 (2010).

180. *Id.*

risk.[181] It can be defined as a model to price the counterparty risk and to quantify the future loss incurred on a derivatives transaction due to the potential counterparty's default.[182] A financial institution or an investment firm must apply the CVA charge to all the non-cleared transactions via central counterparties.[183] The underlying premise of the CVA is that the bilateral collateralisation of an OTC derivative position is structurally imperfect for covering the entire amount of the losses in the event of a counterparty default.[184] For this reason, the use of additional capital in the form of CVA charge could mitigate the contagion effect in case of default and incentivise contractual parties to move towards central clearing. The value of this parameter fluctuates over the contract life according to the market value of the counterparty risk and depends predominantly on four factors:

- *Exposure Profile.* It consists of the estimation of the future value of a derivatives portfolio, starting from actual market data and taking into account possible changes in market conditions.[185]
- *Default Probability.* This factor is used to calculate the probability of default of the contractual parties over the time of the contract. Generally, the credit default swaps are considered reliable parameters to measure the default probability.[186]

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181. BASEL COMM. ON BANKING SUPERVISION, REVIEW OF THE CREDIT VALUATION ADJUSTMENT RISK FRAMEWORK 1 (2015).

182. *Id.*

183. BASEL COMM. ON BANKING SUPERVISION: BD. OF THE INT'L ORG. OF SEC. COMM'NS, MARGIN REQUIREMENTS FOR NON-CENTRALLY CLEARED DERIVATIVES 2 (2015).

184. In fact, the margin has a different function than the capital. The margin follows the "defaulter pay" approach, and it is provided by a counterparty to cover the losses due to its potential default. The capital follows a "survivor-pay" approach, and it is based on the addition of new capital to absorb the losses. *See id.* at 4.

185. EUROPEAN BANKING AUTH., EBA REPORT ON CREDIT VALUE ADJUSTMENT (CVA) UNDER ARTICLE 456(2) OF REGULATION (EU) NO 575/2013 (CAPITAL REQUIREMENTS REGULATION – CRR) AND EBA REVIEW ON THE APPLICATION OF CVA CHARGES TO NON-FINANCIAL COUNTERPARTIES ESTABLISHED IN A THIRD COUNTRY UNDER ARTICLE 382(5) OF REGULATION (EU) NO 575/2013 (CAPITAL REQUIREMENTS REGULATION – CRR) 18 (2015).

186. *Id.* at 19.

- *Existence of collateral or netting agreement.* The daily posting of collateral and the availability of the netting involves a reduction of the CVA charge.[187]
- *The Wrong-Way Risk ("WWR").* The literature confirms that there is a correlation between the CVA and the WWR.[188] Basically, the increase of the WWR determines the increase of the CVA.[189]

Thus, calculation of the CVA is complex and requires a detailed analysis of the entire derivatives portfolio. To quantify the increase of the CVA charge in relation to a new transaction, it is necessary to estimate whether the new trade will affect the counterparty overall position in a positive or negative way. The Basel III rules set up two methods for calculating the CVA charge: the Advanced CVA risk capital charge and the Standardised CVA risk capital charge.[190] The Advanced method imposes the use of internal models with a pre-defined formula to determine the CVA.[191] It only takes into account the adoption of "eligible hedges," as single-name CDS and index CDS, in order to mitigate the CVA charge, without considering other market factors such as interest rate or currency.[192] On the other hand, the standardised method must be used when a financial institution does not have approved internal models.[193] It prefers a more risk-sensitive approach by taking into account, in an enhanced way, the netting/margin agreements and the MPOR to mitigate the CVA charge.[194]

The CVA risk charge has been implemented differently in E.U. and U.S. legislation, increasing the uncertainty in the OTC market. The European Union has adopted the Basel

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187. Teresa Martinez Puerto & George Karalis, *The High Price of Counterparty Risk*, THE TREASURER, May 2012, at 18.

188. *See* Frederick Hoffman, Credit Valuation Adjustment 23 (2011) (unpublished thesis, New College University of Oxford); Mihail Turlakov, *Wrong-Way Risk in Credit and Funding Valuation Adjustments*, ARXIV, Aug. 2012, at 1, https://arxiv.org/pdf/1208.5382; GREGORY, *supra* note 58, at 311.

189. Turlakov, *supra* note 188.

190. BASEL COMM. ON BANKING SUPERVISION, *supra* note 162, at 1.

191. *Id.*

192. ALLEN & OVERY, CAPITAL REQUIREMENTS DIRECTIVE IV FRAMEWORK: *Credit Valuation Adjustment* (CVA) 3 (2014), http://www.allenovery.com/SiteCollectionDocuments/Capital%20Requirements%20Directive%20IV%20Framework/Credit%20valuation%20adjustment.pdf.

193. EUROPEAN BANKING AUTH., *supra* note 185, at 26–27.

194. GREGORY, *supra* note 77, at 377.

CVA charge through two legislative acts: the Capital Requirements Directive IV ("CRD IV") and the Capital Requirements Regulation ("CRR").[195] The principal disharmony between the E.U. regime and the Basel framework concerns a series of transactions exempted from the scope of the CVA charge. Under article 382(3)(4) of CRR, the following are exempt from the calculation of the CVA charge:

- Transactions between clearing members and clients, when the clearing member acts as a simple intermediary of the transactions between the clients and the qualified CCP.[196] This exemption was introduced to not excessively increase the costs of the indirect central clearing and encourage its use rather than bilateral clearing mechanism.[197]
- Transactions with non-financial counterparties, in cases where those transactions do not exceed the clearing threshold.[198]
- Intra-group transactions.[199]
- Transactions with pension funds.[200]
- Transactions with sovereign counterparties.[201]

In the United States, the Basel CVA charge was transposed under article 132(e) of the *Final U.S. Rules.*[202] This legislation is broadly consistent with the Basel framework. The

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195. *See* Council Directive 2013/36/EU on Access to the Activity of Credit Institutions and the Prudential Supervision of Credit Institutions and Investment Firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC, 2013 O.J. L 176/338 [hereinafter CRD IV]; European Parliament and Council Regulation 575/2013 on Prudential Requirements for Credit Institutions and Investment Firms and Amending Regulation (EU) No 648/2012, 2013 O.J. L 176/1 [hereinafter CRR].

196. CRR, *supra* note 195, art. 382(3).

197. EUROPEAN BANKING AUTH., *supra* note 185, at 33.

198. CRR, *supra* note 185, art. 382(4)(a).

199. This exemption is based on article 3 of EMIR. *See* EMIR, *supra* note 115, art. 3.

200. This exemption is based on EMIR art. 89(1).

201. Sovereign counterparties are: European Union's member states or member states' bodies, the Bank for International Settlement, multilateral developments banks, central banks, and regional governments. *See* EMIR, *supra* note 115, arts. 1(4)−(5); CRR, *supra* note 195, arts. 114(4), 115(2).

202. These rules are the result of the joining action between the Office of the Comptroller of the Currency (OCC), the Board of Governors of the Federal Reserve System (Board), and the Federal Deposit Insurance Corporation (FDIC). *See* 12 C.F.R. §§ 217, 324, 3 (2015).

main differences concern: the possibility for U.S. firms to choose between the standardised method and the advanced method (in the Basel rules, this choice is not an option);[203] the possibility for U.S. firms to use the Current Exposure Method[204] ("CEM") as an alternative to the internal models under the advanced approach;[205] and the obligation, under the standardized method, to rely on broad classes of default probabilities to estimate the counterparties' credit quality, rather than relying on the credit rating.[206]

From this comparison, it is clear that the U.S. implementation of the CVA charge mirrors the scope of the Basel framework, differing only in some technical aspects on how calculate the CVA. On the contrary, E.U. law has introduced several exceptions to the general rule, creating a legal disharmony with the U.S. jurisdiction and the Basel framework. Specifically, it seems that E.U. banks have a competitive advantage over non-E.U. financial institutions. In fact, foreign firms will prefer to hedge their derivatives transactions that fall in the aforementioned exemptions with an E.U. dealer, rather than another counterparty (like, for example, a U.S. dealer).[207] In addition, E.U. banks could structure their transactions in such a way as to stem the CVA charge. This could be accomplished by interposing an exempted entity between a bank and a non-exempted bank in an indirect clearing transaction or by dividing the transaction so that it does not exceed the threshold.[208] Practically, these legislative disparities could generate the premises for transatlantic arbitrage.

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203. EUROPEAN BANKING AUTH., *supra* note 185, at 38.

204. The CEM is a less risk-sensitive method. It calculates the Exposure at Default (EAD) through the sum of current exposure with the potential future exposure. *See* GREGORY, *supra* note 58, at 376–77.

205. EUROPEAN BANKING AUTH., *supra* note 185, at 38.

206. *Id.*

207. SHEARMAN & STERLING, BASEL III FRAMEWORK: THE CREDIT VALUE ADJUSTMENT (CVA) CHARGE FOR OTC DERIVATIVE TRADES 4 (2013), http://www .shearman.com/~/media/files/newsinsights/publications/2013/11/baseliii frameworkthecreditvaluationadjustmentcvachargeforotcderivativetradesfiafr 111113.pdf.

208. *Id.*

C.   *The Risk of a Regulatory Arbitrage and the Mitigation Tool*
of Substituted Compliance

As analysed in the previous paragraphs, the Basel CVA framework, EMIR and the Dodd–Frank Act represent a multilateral effort to standardise legal systems in the matter of OTC derivatives. However, the implementation in a domestic dimension of financial regulatory policy can involve unintended consequences and, paradoxically, makes the financial markets more prone to systemic risk.

The principal criticism that can be raised to this collectivist approach regards the risk of a *regulatory arbitrage*.[209] This term generally means the opportunity for a firm to exploit differences among legal systems in order to reduce transactional costs or make extra profit.[210] According to Griffith, the international nature of OTC derivatives allows contractual parties to move their locus from over-regulated jurisdictions to under-regulated jurisdictions.[211] From this perspective, a firm could be encouraged to undertake a derivative transaction in a legal system where the mandatory central clearing has not been yet implemented or, while it is implemented, more temperate. To avoid this practice, E.U. and U.S. regulators have imposed extraterritorial application of E.U. and U.S. law. Section 722(d)(i)(1) of Dodd–Frank in fact allows the application of the clearing rules to transactions outside the United States when they "have a direct and significant connection with activities in, or in effect on, commerce of the United States."[212] Thus, entities that are located abroad, but engage in transactions that exceed the aggregate gross notional amount threshold of £3 billion over a twelve-month period,[213] become subject to U.S. regulations due to the impact that a counterparty default could have in the U.S. financial market. Similarly, arti-

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209. In this article the term "regulatory arbitrage" will be used with a negative connotation as it is not the result of a spontaneous market process, but rather is assumed to be an unintended consequence of the collectivist approach.

210. Alexey Artamonov, *Cross-Border Application of OTC Derivatives Rules: Revisiting the Substituted Compliance Approach 208*, 1 J. Fin. Reg. 206 (2015).

211. Griffith, *supra* note 150, at 1326.

212. *See* 7 U.S.C. § 2(i)(1) (2017).

213. U.S. Commodity Futures Trading Comm'n, Swap Dealer *De Minimis* Exception Preliminary Report 6 (2015), http://www.cftc.gov/idc/groups / public/@swaps/documents/file/dfreport_sddeminis_1115.pdf.

cle 4(4) of EMIR establishes that the clearing obligation, where one or both counterparties are non-E.U. entities, is applied whether the transaction has a "direct, substantial and foreseeable effect within the E.U."[214] or "where the obligation is necessary or appropriate to prevent the evasion of any provisions of EMIR."[215] These criteria are satisfied when: (1) OTC contracts are guaranteed[216] by an E.U. regulated financial firm or (2) the transactions are undertaken between E.U. branches of a non-E.U. entity and another non-E.U. entity.[217] In this way, risky foreign transactions can be regulated by E.U. and U.S. administrative bodies. Furthermore, in order to substantially harmonise the two regimes, on February 10, 2016, the CFTC and the European Commission announced a common approach to the requirements for central clearing counterparties.[218] This agreement recognises that both jurisdictions are comparable[219] and, consequently, it is possible to realise "substitute compliance."[220] That is, an E.U. swap provider can apply for an exemption from the U.S. legislation (and vice versa) on compliance with the same regulatory regime.[221] On the one hand, the concept of substituted compliance seems to an-

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214. *See* EMIR, *supra* note 115, art. 4(4).

215. *Id.*

216. "Guarantee" means an explicitly documented legal obligation by a guarantor to cover payments due to the beneficiary in the event of a counterparty's default. The quantitative threshold of the guarantee must exceed the gross notional amount threshold of _8 billion. *See EMIR Cross-Border Issues*, European Union Emissions Trading Scheme (Mar. 21, 2016, 11:53 PM), http://www.emissions-euets.com/cross-border-issues.

217. *Id.*

218. Press Release, U.S. Commodity Futures Trading Comm'n, The U.S. Commodity Futures Trading Commission and the European Commission: Common Approach for Transatlantic CCPs (Feb. 10, 2016), http://www.cftc .gov/PressRoom/PressReleases/cftc_euapproach021016.

219. To assess the comparability of a foreign jurisdiction, the CFTC takes into account the following factors: (a) the comprehensiveness of the requirements, (b) the scope and the objectives of the relevant requirements, (c) the comprehensiveness of the foreign regulatory supervisory compliance program, and (d) the foreign jurisdiction's authority to support and enforce its oversight of the registrant. *See* Commodity Futures and Trading Comm'n, Comparability Determination for the European Union: Dually-Registered Derivatives Clearing Organizations and Central Counterparties 9–10 (2016) http://www.cftc.gov/idc/groups/public/@newsroom/documents/file/federalregister031616.pdf.

220. *Id.* at 4.

221. *Id.*

nihilate the risk of a regulatory arbitrage between E.U. and U.S. firms. On the other hand, it has a significant impact on all other countries' markets, which end up financially isolated since they do not transpose EMIR and Dodd–Frank into national law.[222] Thus the tool of substitute compliance generates a wider question regarding the adverse consequences of a standardised approach to the regulatory financial system.

D. *Fragility and Uncertainty: The Limits of the Collectivist Approach*

If the casual opacity between the internal relationships is ignored, making the regulation of financial systems uniform seems like an optimal solution against the systemic risk.[223] However, as a spontaneous order, financial systems are characterised by a high degree of complexity that makes it difficult to predict how different single elements will interact with each other.[224] According to Hayek, it is only possible to determine the abstract features of a complex phenomenon, but not the particular circumstances in which each element is placed.[225] He argued that a spontaneous order is a dynamic equilibrium between individual actions determined by individual expectations.[226] The interdependences between single elements following certain rules of conduct[227] allow the evolution and improvement of the order.[228] On the contrary, standardised legislation could paralyse the evolutionary process and make the order more vulnerable in case of financial stress. A uniform regulatory system thereby limits innovation and prevents the competition between different solutions to

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222. Artamonov, *supra* note 210, at 220.

223. TALEB, *supra* 31 note, at 57 (2012).

224. *See* HAYEK, *supra* note 15, at 37–38; Saule T. Omarova, *Bankers, Bureaucrats, and Guardians: Toward Tripartism in Financial Services Regulation*, 37 J. CORP. L. 621, 625 (2012).

225. HAYEK, *supra* note 15, at 41.

226. *Id.* at 48–52.

227. The rules applied to a spontaneous order were called "rules of conduct" by Hayek. The characteristic of these general and abstract rules is that they do not determine a particular action, but simply limit the range of permitted actions. *See id.* at 121.

228. Hayek's evolutionary theory of law is based on the spontaneous dissemination of rules of conduct in each social order. This cultural evolution enables the improvement and the progress of the social order. *See id.* at 22–24.

problems.[229] In other words, this type of system becomes "fragile."[230] Nassim Taleb asserted that the "fragility" is an *iatrogenic*[231] effect of excessive interventionism.[232] By using trial and error, a complex system receives information about what "does not work"[233] and can endogenously improve itself.[234] Stressors, randomness, and volatility are the conditions required to develop an "anti-fragile" system immune to "large-scale unpredictable and irregular events of massive consequence."[235] Uniform systems lack the ability to learn from their imperfections and to test new solutions. An efficient macro-regulatory regime, therefore, should promote the diversity and the adoption of heterogeneous models to mitigate the systemic risk.[236] According to Bruno Leoni, centralised regulation "creates long-run uncertainty"[237] due to the unpredictability of the consequences[238]

In this line, Diebold, Doherty, and Heering argued that prudential supervisors and policy makers are in a situation of incomplete knowledge about how their actions affect the financial system.[239] By adopting the *KuU* (Known, unknown and the Unknowable) model, they classified the knowledge in three situations:[240] *K* is related to situations where outcomes and probabilities are completely specified (*risk*); *u* refers to situations where the probabilities cannot be specified in relation to the single parts (*uncertainty*); *U* is related to situations where both probabilities and outcomes cannot be predicted ex ante.[241] The systemic risk in the financial markets falls in the *u* category because it can be analysed in terms of collective and

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229. Griffith, *supra* note 150, at 1345.

230. *Id.*

231. For Taleb, *iatrogenic* means the costs and the losses generated by an unnecessary treatment. *See* TALEB, *supra* note 31, at 111.

232. *Id.* at 111–12.

233. *Id.* at 71.

234. *Id.*

235. *Id.* at 6.

236. Griffith, *supra* note 150, at 1346.

237. LAW AND ECONOMICS: A READER 205 (Alain Marciano ed., 2009).

238. *Id.*

239. FRANCIS X. DIEBOLD, NEIL A. DOHERTY & RICHARD J. HERRING, THE KNOWN, THE UNKNOWN AND THE UNKNOWABLE IN FINANCIAL RISK MANAGEMENT 27 (2008).

240. *Id.* at 2.

241. *Id.* at 2–3.

individual impact.[242] While the first can be expected a priori through internal control models, the second is deeply uncertain. This condition of imperfect knowledge prevents regulators from anticipating sources of systemic risk and from elaborating accurate pricing models[243] (as for the CVA charge). An optimal approach would be to leave, in the case of a *u* situation, a margin of legal flexibility. All these arguments suggest that the mandatory central clearing framework is an inadequate tool for reducing systemic risk. It paralyses the competitive evolution between legal orders and makes the whole financial system uniformly fragile, especially in the event of a CCP failure.

IV.
THE (IM)PROBABILITY OF A CCP DEFAULT?

A.   *The Default Waterfall and the Loss Allocation*

It should be clear that a CCP is exposed to the market risk only in the scenario of a clearing member's default. In this event, a CCP needs an adequate recovery mechanism to re-establish its matched book and liquidate the defaulting positions.[244] Typically, the principal tool used by a CCP is the auction process.[245] The surviving members are called to submit an offer for the defaulting portfolio and the default management group will accept the best bid price.[246] During this phase, however, the CCP must continue to pay the variation margin of the surviving members' open positions with the risk of accumulating massive losses, especially in high-volatility periods.[247] In addition, the CCP is exposed to potential liquidation costs due to the market bid/ask spreads and the long time horizon necessary to liquidate large portfolios.[248] For these reasons, the CCP is provided with a pool of sharing mechanisms that should, theoretically, guarantee its solvency.[249]

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242. *Id.* at 9.

243. *Id.* at 21.

244. INT'L SWAPS AND DERIVATIVES ASS'N, CCP LOSS ALLOCATION AT THE END OF THE WATERFALL 7 (2013).

245. GREGORY, *supra* note 3, at 140.

246. *Id.*

247. RAMA CONT, THE END OF THE WATERFALL: DEFAULT RESOURCES OF CENTRAL COUNTERPARTIES 7 (2015).

248. *Id.* at 14.

249. *Id.* at 7, 10.

The first mechanism is to maintain significant financial resources available in a well-defined *default waterfall* hierarchy.[250] By doing so, the CCP's exposure is covered by different layers of protection that should ensure an orderly and predictable resolution. In a typical default waterfall, the losses are primarily absorbed by the initial margin.[251] If it is not sufficient, the next layer is the defaulting member's contribution to the mutualised default fund.[252] Substantially, the default fund is a flexible resource to cover the CCP against tail risk and different stress scenarios.[253] Each fund has a different size in accordance with the individual risk profile.[254] All major CCPs calibrate the default fund to cover the losses caused by the failure of the two clearing members with the largest credit exposure.[255] Additionally, the CCP contributes to the default waterfall through a part of its capital.[256] In this way, the CCP operator has a "skin-in-the-game" incentive to configure prudential risk management measures.[257] By having the equity capital exposed to eventual losses immediately after the clearing member's initial margin and default fund, the CCP operator is more sensitive to the credit quality and margin requirements of the clearing members.[258] Nevertheless, if the losses exceed these pre-funded resources, the CCP have recourse *in primis* to the default funds of the other clearing members and, *in secundis,* to a further contribution from the mutualised default fund (right of assessment).[259] According to Duffie, the supply

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250. Int'l Swaps and Derivatives Ass'n, CCP Default Management, Recovery and Continuity: A Proposed Recovery Framework 8 (2015).

251. David Elliot, Bank of Eng., Central Counterparty Loss-Allocation Rules 5 (2013).

252. *Id.* at 6.

253. LCH.Clearnet, Basel III Consultation 2 (2011).

254. *Id.*

255. *See* LCH.Clearnet, CCP Risk Management, Recovery and Resolution 13 (2016); *see also* CME Grp., Clearing-Balancing CCP and Member Contributions with Exposures 3 (2015).

256. *See* Int'l Swaps and Derivatives Ass'n, *supra* note 231, at 8 (explaining that the CCP contributed capital is provided in two different tranches).

257. Louise Carter & Megan Garner, Reserve Bank of Austl., Skin in the Game – Central Counterparty Risk Controls and Incentives 85 (2015).

258. *Id.*

259. Elliot, *supra* note 251, at 6.

of additional capital should be contractually capped.[260] Un-capped obligations would encourage moral hazard and lead clearing members to resign from the CCP.[261]

In the circumstance where the default waterfall is not able to completely absorb the losses, the CCP's rulebook provides *recovery plans* to allow the restructuring of the CCP's payment obligations to surviving members.[262] These measures are the Variation Margin Gains Haircutting ("VMGH") and the "tear-up" of the contracts.[263] Under the VMGH's approach, the CCP reduces ("haircuts") pro rata the mark-to-market gains in terms of variation margin payments, accumulated by the clearing members from the beginning of the default procedure.[264] At the same time, the CCP continues to collect the payments owed by the clearing members whose positions have decreased.[265] By doing so, the remaining losses are distributed proportionally among the surviving members' portfolio[266] and the CCP ensures short-term liquidity.[267] From the clearing member's perspective, this method does not create unlimited contingent exposure since its loss is circumscribed to the extent of its in-the-money claim.[268] According to the ISDA, the VMGH mimics the economics of insolvency in a bilateral market where the gaining parties pay more.[269] For this reason, it could, in theory, incentivise the clearing participants to actively bid in the auction process and, meanwhile, to reduce their trades with low creditworthy counterparties.[270]

The tear-up consists of the right of the CCP to cancel selected affected contracts ("partial tear-up") or all the affected contracts ("complete tear-up") of the surviving clearing mem-

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260. Darrell Duffie, *Resolution of Failing Central Counterparties* 4 (Stanford Graduate Sch. of Bus., Working Paper No. 3256, 2014), https://www.gsb.stanford.edu/faculty-research/working-papers/resolution-failing-central-counterparties.

261. Gregory, *supra* note 3, at 186.

262. Duffie, *supra* note 260, at 5.

263. *Id.*

264. Int'l Swaps and Derivative Ass'n, *supra* note 244, at 11.

265. Elliot, *supra* note 251, at 7.

266. Int'l Swaps and Derivative Ass'n, *supra* note 244, at 4.

267. Duffie, *supra* note 260, at 5.

268. Elliot, *supra* note 251, at 7.

269. Int'l Swaps and Derivative Ass'n, *supra* note 244, at 11.

270. *Id.*

bers.[271] In this way, the unmatched contracts are liquidated at the price of the last variation margin payments.[272] When the CCP does not have enough resources to fully pay the settlement prices, these obligations are haircut pro rata across all clearing participants that have a position opposite to that of the defaulting member.[273] Put differently, the tear-up procedure restores the CCP matched book by cancelling some or all of the positions opposite to those of a defaulter's trades.[274]

B. *The First Limit of the Loss-Sharing Mechanism: The Prisoner's Dilemma*

A dynamic participation in the auction is crucial to maintain the solvency of the CCP. However, the structure of the default waterfall makes it difficult to determine the strategy of a clearing member and for which price that member will be willing to assume the risky position. In the context of game theory, this situation is a perfect paradigm of the prisoner's dilemma.[275] Specifically, the *collective* incentive of a clearing member to adopt a cooperative strategy in the auction process is in conflict with the *individual* interest to defect.[276] A great deal of the literature has confirmed that mutual cooperation is rare in the prisoner's dilemma.[277] The theoretical outcome is that all players tend to display a non-cooperative behaviour and, thus, prefer to obtain a less gain rather than cooperate with each other and realise mutual benefits.[278] As a result, during the auction process, the dominant strategy (Nash Equilibrium) for the surviving members is to realise *individual* profit by adopting a conservative approach or resigning from the CCP.[279] Although the CCP uses, as noted previously, the

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271. ELLIOT, *supra* note 251, at 8.

272. BANK FOR INT'L SETTLEMENTS AND INT'L ORGANIZATION OF SEC. COMM'N, RECOVERY AND RESOLUTION OF FINANCIAL MARKET INFRASTRUCTURES 7 (2012).

273. *Id.* at 7.

274. GREGORY, *supra* note 3, at 190.

275. ELLIOT, *supra* note 251, at 9.

276. *Id.*

277. Gary Charness et al., *Endogenous Transfers in the Prisoner's Dilemma game: An Experimental Test of Cooperation and Coordination*, 60 GAMES & ECON. BEHAVIOUR 287, 288 (2007).

278. *Id.*

279. Each finite non-cooperative game always has at least one equilibrium point. However, as in the case of the prisoner's dilemma, independent ra-

VMGH and the tear-up to stimulate mutual cooperation between counterparties and mitigate the prisoner's dilemma, in practice these mechanisms have a modest efficacy.[280] The main reason is that they share losses in an unpredictable way.[281] According to Duffie, there are no persuasive reasons or incentive benefits for clearing members to prefer disproportionate and unpredictable loss sharing methods.[282] The marginal cost that they should support to amortise an incremental unit of unexpected loss involves a significant increase in the total amount of losses (convexity effect).[283] Hence, for a clearing member, it could be better to suffer a foreseeable loss leading the CCP to a failure resolution procedure[284] rather than cooperate in an unequal and unpredictable loss-sharing mechanism.[285]

C.   *The Second Limit of the Loss-Sharing Mechanism: Moral Hazard and the Stag Hunt*

The mutualisation of the default losses among the clearing members implicates another undesirable effect, which can assume the form of an indirect cost for the CCP: moral hazard.[286] This problem exists because loss-sharing tools influence the behaviour of market participants about the perception of real risk assumed in a derivatives transaction.[287] While in a bilateral OTC market the default of a dealer is supported by the counterparty only in relation to their outstanding position, in a centralised market, potential losses are covered by the balance sheets of the other clearing members.[288] Consequently, a clearing member's customer does not suffer any losses during the failure of the dealer until all the CCP's members are *collec-*

tional choices are not always Pareto optimal. In fact, when the gains (or payments) are not identical, mutual cooperation is less likely although it would be more advantageous. *See* Charness et al., *supra* note 258, at 289; John Nash, *Non-Cooperative Games*, 54 ANNALS MATHEMATICS 286 (1951).

280. GREGORY, *supra* note 3, at 189.
281. Duffie, *supra* note 260, at 6.
282. *Id.* at 7.
283. *Id.* at 6–7.
284. An example is government bailout. *Id.* at 8.
285. *Id.* at 7.
286. Pirrong, *supra* note 9, at 12.
287. *Id.* at 10–12.
288. *Id.* at 11.

tively solvent.[289] It is necessary to emphasize that, in fact, the loss-sharing mechanisms represent tools to shift a specific dealer's balance sheet risk from the customer to the balance sheet of the other clearing members.[290] Through this practice, dealers are encouraged to take more risk and increase the size of their trading positions.[291] A perfect explanation of this behaviour is offered by the "stag hunt" game.[292] As opposed to the prisoner's dilemma, in the stag hunt there are two Nash equilibria:[293] the parties can collaborate to catch the stag or each party can pursue their individual interest and catch the hares.[294] Clearly, the Pareto optimal solution is to collaborate in order to obtain a major mutual benefit (catching the stag).[295] However, if a player is not able to predict the strategies of the other parties, he will opt to pursue his *individual* interest (catching the hares).[296] In the stag hunt game, the option that is considered a rational choice for one player depends on his belief concerning the likely choices of the other players.[297] In the CCP, a clearing member is encouraged to assume additional risk in reliance on the protection provided by the mutualised default fund and on the active participation of the other clearing members in the loss-sharing mechanism.[298] In a complex and dynamic market, the satisfaction of these expectations is deeply tied to the game strategies of the other players. A clearing member who chooses to take large positions (hunt the stag) assumes the risk that the other members will not cooperate in the default procedure (hunt the hares).

An effective explanation of this behaviour is offered by David Hume.[299] In *A Treatise of Human Nature*, Hume observes

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289. *Id.* at 10–11.

290. *Id.* at 11.

291. *Id.* at 12.

292. Yesha Yadav, *The Problematic Case of Clearinghouses in Complex Markets*, 101 Geo. L.J. 387, 417 (2012).

293. Larry Samuelson, Evolutionary Games and Equilibrium Selection 79 (1997).

294. Yadav, *supra* note 292, at 418.

295. *Id.*

296. *Id.*

297. Brian Skyrms, The Stag Hunt and the Evolution of Social Structure 3 (2004).

298. Yadav, *supra* note 292, at 418.

299. Skyrms, *supra* note 297, at 2.

that "two neighbours may agree to drain a meadow, which they possess in common; because it is easy for them to know each other mind; and each must perceive, that the immediate consequence of his failing in his part, is, the abandoning the whole project. But it is very difficult, and indeed impossible, that a thousand persons should agree in any such action . . . ."[300] This point emphasizes that for Hume, cooperation in the stag hunt is consonant to rationality.[301] Thus, cooperation is more likely in a two-person stag hunt than in a multi-person stag hunt[302] (as in the case of the CCP). From this analysis, it appears clear that loss-sharing mechanisms are not a panacea against the default risk and can lead clearing members to adopt bad strategies. The inability of the clearing members to *internalize* the costs and benefits of their decisions, as in the bilateral market, increases the moral hazard and the volume of their risky-trading activities.[303]

D.   *The Probability of the CCP Default Under the Frequentist Approach: The Misesian Concept of Case Probability and the Black Swan*

The core of the mandatory central clearing regulations is based on the assumption that the CCPs have a low *probability* of default.[304] In this light, the Basel Committee has assigned only a nominal two percent of risk-weight to banks' trade exposures towards qualified clearing houses.[305] In the view of the regulators, the loss-sharing mechanisms and the collateralised positions make the CCPs less likely to fail than other financial intermediaries.[306] The systemic importance of this assumption requires a methodological analysis of the concept of *probability* and its application in the social sciences field.

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300. DAVID HUME, A TREATISE OF HUMAN NATURE 422 (Univ. of Adelaide 2015) (1739).

301. SKYRMS, *supra* note 297, at 2.

302. *Id.*

303. Pirrong, *supra* note 9.

304. BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT'L SETTLEMENTS, CAPITAL TREATMENT OF BANK EXPOSURES TO CENTRAL COUNTERPARTIES 11 (2013).

305. *Id.*

306. EUROPEAN SYSTEMIC RISK BOARD, ESRB REPORT TO THE EUROPEAN COMMISSION ON THE SYSTEMIC RISK IMPLICATIONS OF CCP INTEROPERABILITY ARRANGEMENTS 4 (2016).

The starting point of this discussion is the frequency interpretation of the probability given by Richard von Mises.[307] He considered probability to be a notion that must be circumscribed to a properly defined collective ("Kollektivs").[308] A collective is a mathematical abstraction representing a set of events or attributes, the limit of which is determined by the particular frequency of those events or attributes. Thus, it is possible to define the probability of an event only in relation to its relative frequency within a certain collective and not make general statements concerning the singular event.[309] These assumptions involve three postulates: first, the theory of probability can never refer to a single event; second, the calculation of probability is empirical and based on experience (objective); third, a sort of a priori probability cannot exist.[310] By adopting these premises, his brother, Ludwig von Mises, discerned two different subsets of probability: *class probability* (collective) and *case probability* (individual event or attribute).[311] Class probability means that "we know or assume to know, with regard to the problem concerned, everything about the behaviour of a whole class of events or phenomena; but about the actual singular events or phenomena we know nothing but that they are elements of this class."[312] With this definition, Ludwig von Mises claimed that each particular event is homogeneous and has its own peculiar characteristics.[313] Therefore, we cannot know all the specific aspects of such an event, except its association with a common class of events.[314] This type of probability has the frequency of an entire class of events as

307. VAN LAMBALGEN, supra note 35, at 30.

308. *Id.*

309. The starting point of the frequency probability is the limitation of knowledge. Being each *individual* event or attribute unique and with own characteristics, we lack of adequate knowledge to elaborate reliable probability theories on it. Our knowledge can concern only the relative frequency of a greater *collective* (a set of events or attributes). *See id.*

310. Hans-Hermann Hoppe, *The Limits of Numerical Probability: Frank H. Knight and Ludwig von Mises and the Frequency Interpretation*, 10 Q. J. AUSTRIAN ECON. 3, 5 (2007).

311. MISES, supra note 21, at 107.

312. *Id.*

313. Hoppe, *supra* note 310, at 9.

314. *Id.*

an object, and thus must be applied only to the natural sciences.[315]

Contrarily, case probability means that "we know, with regard to a particular event, some of the factors which determine its outcome; but there are other determining factors about which we know nothing."[316] The object of case probability is human action.[317] Here, it is not possible to make any reference to frequency calculations because human actions and relative choices are the result of individual, subjective, and momentary value judgement.[318] Abstractly, it is possible to argue that class probability is linked with the concept of *risk* (calculable), while case probability deals with *uncertainty* (not calculable).[319] In the case of the CCPs, we are in the territory of case probability. From what has been observed in the previous paragraphs, the failure of a CCP is strictly linked to how the clearing members will act in the loss-sharing waterfall. The randomness of human action makes the application of frequency probability difficult to elaborate numerically.[320] The lower probability of default given by the CCPs is based on the false premise that it is possible to predict the consequences of a single specific event. But the theory of probability can concern solely a defined *collective*. A human action, instead, is a unique and unrepeatable event, forming its own class.[321] It is based on a particular experience and, therefore, cannot be traced back to a finite sequence of past events. Applying class probability to human action, as in the CCPs' context, is the typical error called the "gambler's fallacy"[322] by Mises. Like the gambler, macroprudential regulators presume to be able to predict a certain outcome on a specific event by bringing this

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315. MISES, *supra* note 21, at 107.

316. *Id.* at 110.

317. *Id.* at 111.

318. Hoppe, *supra* note 310 at 13–14.

319. Concerning the definitions of "Risk" and "Uncertainty," we assume the interpretation given by Frank H. Knight (1885–1972). Risk refers to the situation in which it is possible to assign probabilities to outcomes and, therefore, it is a measurable concept. Uncertainty, on the other hand, is objectively unmeasurable and does not assume a probabilistic calculation. *See* Richard N. Langlois & Metin M. Cosgel, *Frank Knight on Risk, Uncertainty and the Firm: A New Interpretation*, 31 ECON. INQUIRY 456, 457 (1993).

320. Mises, *supra* note 21, at 113.

321. *Id.* at 111; HOPPE, *supra* note 310 at 19.

322. MISES, *supra* note 21, at 110.

event back to an abstract collective, without considering the ignorance regarding the particular attributes and circumstances that determined such an event.

The above statement finds further confirmation in Nassim Taleb's analysis of probability distribution.[323] In the mathematical field, probability distribution is a function with diverse properties over a domain of possible results.[324] It expresses attributes to the future through the analysis of a sequence of past data.[325] In the natural sciences, the distribution is Gaussian[326] (or normal) and, for this reason, a set of variables that allow restriction and limitation of the oscillation of the data can be identified.[327] On the contrary, in the social sciences, the variables are related to specific human actions, whereby they are not subject to any restrictions that limit the variance of the data. According to Taleb, the use of probability distribution in the social domains leads us to exclude the possibility of future high-impact events called "Black Swans."[328] A Black Swan is described as an event that: (1) is outside regular expectations; (2) has an extreme impact; and (3) is retrospectively predictable.[329] The uniqueness of the Black Swan prevents mathematical statistics from predicting it.[330] Due to the insufficiency and asymmetry of past data, the Black Swan does not fall in any known distribution.[331] Hence, it does not matter how much information is available to the market-operators (or the law-makers); no matter what, according to the theory of knowledge, they will not be able to establish a correct probability.[332]

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323. *See* Nassim N. Taleb & Avial Pilpel, On the Unfortunate Problem of the Nonobservability of the Probability Distribution (2004) (unpublished manuscript).

324. *Id.* at 2.

325. *Id.*

326. The Gaussian distribution is used to calculate the VaR. *See supra* Section II.D.

327. Taleb & Pilpel, *supra* note 323, at 9.

328. Nassim N. Taleb, *Black Swans and the Domains of Statistics*, 61 AMERICAN STATISTICIAN 1, 1 (2007).

329. NASSIM NICHOLAS TALEB, THE BLACK SWAN: THE IMPACT OF THE HIGHLY IMPROBABLE xvii-xviii (2007).

330. Taleb & Pilpel, *supra* note 323, at 4.

331. NASSIM NICHOLAS TALEB, PROBABILITY AND RISK IN THE REAL WORLD 13 (2013).

332. Taleb & Pilpel, *supra* note 323, at 2.

The common mistake of risk management operators, as in the case of the CCPs, is to confuse a *bet* with an *exposure*.[333] A bet is a binary outcome.[334] An exposure, instead, has more vague results and depends on a distribution generally called "vanilla."[335] A binary prediction concerns a defined event and contemplates only two possible outcomes: zero or one.[336] For example, a candidate running for an election can win or lose.[337] Other outcomes are not contemplated. A vanilla prediction, instead involves a frequency of multi-payoffs which can have different values.[338] The continuous change of variables makes vanilla prediction more complex and more difficult than binary prediction. Specifically, in vanilla prediction, we must separate *X*—a random or non-random variable—and *f(X)*, the exposure.[339] Our knowledge is limited to *f(X)*, while we are in epistemological uncertainty regarding the value of *X*.[340] For instance, we can predict if a company will be profitable, but we cannot determine if the profit will be $1 or $10 billion.[341]

Probability Distribution of x   Probability Distribution of f(x)
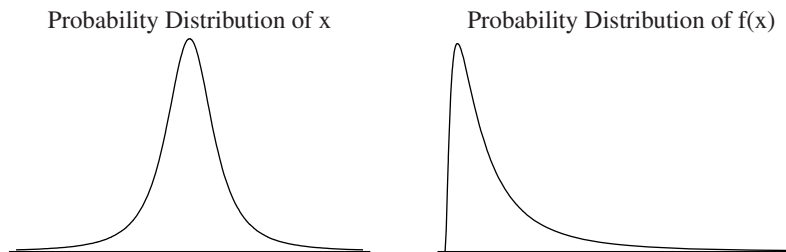
Graph n. 5[342]

As shown by the graph, the non-linearity of *f(X)* implies that its probability distribution is markedly different in com-

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333. TALEB, *supra* note 331, at 85.
334. *Id.*
335. *Id.*
336. *Id.*
337. *Id.*
338. *Id.*
339. NASSIM NICHOLAS TALEB, *Silent Risk*, in LECTURES ON PROBABILITY, VOLUME 1 299 (2015).
340. *Id.*
341. TALEB, *supra* note 331, at 85.
342. TALEB, *supra* note 339, at 299.

parison to *X*.[343] Conceivably, there exist an infinite number of functions f depending on a sole variable *X*.[344] Given our limited knowledge of *X*, it is a mistake to reduce the probability to a single number, rather than consider the entire distribution.[345] Therefore, vanilla predictions are inevitably vulnerable to Black Swan events and model errors.[346] Exchanging a vanilla question with a binary question can be very dangerous and exponentially increases the tail risk in the financial markets. In relation to this analysis, the failure of a CCP can be considered a Black Swan event.[347] Assigning a low probability of default to CCPs, based on a summary knowledge about random variables (*X*), is a legislative *bet*. Clearing houses have failed before and it is beyond the knowledge of regulators and policy-makers to exclude a priori dramatic scenarios. A better risk management approach would be to accept the *uncertainty* surrounding the operation of the CCPs in the financial markets and become aware of the limitations of knowledge in predicting Black Swan events.[348]

CONCLUSION

In the irrational exuberance following the 2008 global financial crisis, regulatory initiatives made the central clearing counterparties systematically important for the stability of the OTC derivatives market. The *condicio sine qua non* of the massive legislative revolution was based on the idea that the structure of the CCPs allows a more transparent and efficient management of counterparty credit risk than bilateral mechanisms do. By applying a casual-genetic method, this Article refuted such claims, through the comparison of the CCP's legal principles with those postulated by methodological individualism. Initially, this Article illustrated the functions of novation, multilateral netting, and margining in relation to market dynamics. Then, it entered the core of Dodd–Frank and EMIR to highlight the fallacy of the collectivist approach. Finally, it discussed the *presumptive* remote case of a CCP default in relation

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343. *Id.*
344. *Id.*
345. *Id.* at 300.
346. TALEB, *supra* note 331, at 87.
347. *Id.* at 88.
348. *Id.*

with frequency probability theory. What emerged from this analysis is that clearing OTC contracts through the CCPs can expose market participants to several adverse incentives.

First, the actual CCP margin-setting encourages clearing members to increase the leverage of their portfolios in periods of low volatility and to quickly deleverage their positions in stressed times to meet the margin calls. A CCP with a demanding margin ensures that its value is pegged to the market value of the relevant asset, using price risk models (such as VaR). Asymmetric information and the complexity of some classes of OTC derivatives, prevent the CCP from adequately calculating ex ante the fluctuation of these underlying assets. With the risk of exacerbating the margin calls in the case of wrong evaluations. This practice generates a pro-cyclical effect in financial markets and, potentially, distorts the price systems by over-collateralising or under-collateralising certain positions without rational behaviour.

Second, subsidising and mutualising default loss mechanisms incentivises clearing members to take additional risk. The absence of any rules to internalise the cost of a default implies that the balance sheets of the clearing members are treated as a public good, creating the conditions for a classic tragedy of commons. Each clearing member has an incentive to increase the volume of their trading since they do not bear the connected default costs. More specifically, each clearing member is induced to recklessly add excessive risk to its balance sheet without robust due diligence.

All of these uncertainties force the CCP to accept an epistemological limit: the inability to predict what the behaviours of the clearing members in adverse market scenarios will be. The paradigms of the prisoner's dilemma and the stag hunt demonstrated that mutual cooperation to pursue the optimal solution is rare. Market players prefer to realise a suboptimal *individual* profit rather than adopt a cooperative strategy and obtain a higher *collective* gain. Assuming David Hume's perspective, where cooperation is associated with rationality, it is difficult to achieve mutual goals in a multi-person game. Therefore, CCPs are in a situation where they cannot foresee if clearing members will act to maximise benefits or minimise costs.

Given this lack of knowledge, uniform financial regulations could contribute to expanding the systemic risk in finan-

cial markets, rather than circumscribing it. Collective approaches focusing on stability and harmonization prevent competitiveness between different solutions and make regulatory systems uniformly fragile. Such structures discourage experimentation and the innovation of alternative regimes, thus becoming extremely vulnerable to unpredictable shocks.

In order to be more *anti-fragile,* it is important for a system to accept the failure of particular elements. First, trial and error eliminates weak links in the system and replaces them with robust constituent elements. Second, as postulated by Hayek, the failure of some elements of the system provides feedback that informs other elements of the system as to what works and what does not. Thus, a spontaneous evolutionary process strengthens the system internally and permits efficient allocation of the resources. With regard to OTC derivatives, an important aspect to highlight concerning regulatory alternatives is that a significant part of the benefits attributed to the CCPs are provided more effectively in the bilateral OTC derivatives market. OTC contracts are radically different from other financial contracts. A major part of OTC products (such as cross-currency swaps, energy derivatives, total return swaps, and overnight index swaps) is complex and illiquid with long-term maturities. These types of contracts have unique economic terms (e.g. currency denominations, underlying asset, etc.) and are used by investment/pension funds, governments, and financial institutions to hedge specific risks that cannot be centrally cleared. Such risks include the currency risk in an asset portfolio, risk of fluctuations in the underlying energy prices, risk manage cash-flows, and interest rate risks. If OTC-users are forced to move away from bilateral clearing transactions, they could not adequately hedge their positions and thus run basis risk. The bilateral clearing is based on the "survivor pays" approach, where parties must collect capital to cover the losses of potential counterparties' default. As a consequence, contractual parties are more sensitive to the credit quality of a product and will develop appropriate pricing models accordingly. Furthermore, in bilateral clearing, the risk associated with an OTC transaction is evaluated by each party carefully and with a long-term perspective, damning moral hazard incentives. Derivatives users can avoid incurring basis risk in their hedging strategies by optimizing the decision-making process.

Rather than forcing market participants to clear their OTC contracts through the CCPs, an efficient regulatory approach should leave the decision about central clearing to the judgement of individual market participants. The OTC-user is more able to assess in which particular circumstances clearing transactions via CCPs would generate competitive advantages, and in which this would not be beneficial. On the contrary, law-makers and regulators are in a position of epistemological uncertainty. The opacity of market relationships and the randomness of human actions preclude them from formulating *ex ante* correct predictions. To achieve greater financial stability, this Article proposes a shift of regulatory focus from attempting to eliminate systemic risk in financial markets, to accepting it as an unpredictable variable of derivatives transactions. This is not to say that bilateral markets cannot be improved, but that in a complex financial system, regulatory initiatives should reflect the effective use and underlying risk characteristics of OTC derivatives contracts. OTC users need customized agreements for reducing risks related to strategic initiatives like capital raising, merger and acquisitions, or changes in commodity and energy prices. Bilateral markets offer the flexibility to negotiate the contractual terms and to maximize the allocation of risks. CCP's margin contributions and guarantee fund represent costs for OTC users that can discourage economically important investments or risk hedging activities. Additionally, netting opportunities are reduced since market participants divide their portfolio across multiple CCPs. To be in line with the market dynamics and the role of OTC contracts in the financial markets, CCPs should be reconsidered, by both regulators and end-users, in their historical legal functions of *compensatio* and *novatio* instead of a panacea against the systemic risk.