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How to Analyze the Costs and Benefits of Introducing a Central Counterparty

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Abstract

Central counterparties (CCPs) require a certain level of market development to operate in a safe and efficient manner. This note presents a practical cost-benefit analysis framework for country authorities to decide whether this specific type of financial market infrastructure will benefit their markets, financial institutions, and investors, or whether the costs of a CCP are higher than its benefits. The note discusses three key questions: (1) Are the necessary preconditions met—for example, is the market sufficiently liquid to enable the CCP to calculate margin?; (2) Will a CCP support a well-functioning market?; and (3) Is there a positive business case? Introducing a CCP is recommended only when all questions can be answered in the affirmative. Otherwise, alternative clearing models should be considered, such as bilateral clearing between financial institutions, multilateral netting with a guarantee, prefunding, or clearing through a CCP abroad. Often, introducing a CCP uncovers a chicken-and-egg problem whereby a CCP will positively impact market liquidity while at the same time a minimum level of market liquidity is a condition to set up a CCP. In such cases, the introduction of a CCP should be part of a comprehensive market development plan.

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Introduction and Summary

Central counterparties (CCPs) are financial market infrastructures that interpose themselves between counterparties in a financial market, becoming the buyer to every seller and the seller to every buyer to ensure the performance of open contracts. CCPs can bring important benefits to financial markets, such as reduced counterparty risks, operational efficiencies, central management of a defaulting market participant, and transparency. CCPs also support anonymous electronic trading, where participants cannot always manage their credit risks bilaterally through their choice of counterpart. Box 1.1 elaborates on the functioning of CCPs. In short, CCPs can be tools to strengthen risk management and support market development. However, CCPs also concentrate risks, which makes them systemically important. This – the concentration of risks, strengthening risk management, and supporting market development – is why CCPs are increasingly regulated and supervised.



BOX 1.1:

What is a CCP?

A central counterparty (CCP) is the single counterparty in a specific market for trades received from trading counterparties—through exchanges, the trading or matching of platforms, or the clearing of members—thereby guaranteeing the performance of open contracts. The CCP becomes the buyer to the seller and vice versa through novation or open offer. Novation is the legal process in which the original contract between the buyer and seller is replaced by two new contracts, one between the CCP and the buyer and the other between the CCP and the seller. Open offer means that a CCP is automatically the counterpart at the moment that the buyer and seller conclude the transaction, which means that there is never a contractual relationship between the buyer and seller.

Following novation, the CCP can perform multilateral netting of positions and trades, which reduces counterparty credit risk of the original trading counterparties and allows for a reduced number of settlement instructions. Having fewer instructions reduces operational complexity and risks. Subsequent benefits for clearing members are improved return-on-capital ratios and creditworthiness.

Because every buyer has a seller, a CCP works as a closed zero-sum system under the condition that all the buyers and sellers meet their obligations. However, in the case of a counterparty default, this closed system is broken and the CCP must act to re-establish a matched book. To ensure that the CCP can continue to meet its obligations, it should have risk management and default management procedures in place to handle the default of a clearing member in an organized manner. Any losses that the CCP faces are allocated through a default waterfall, which consists of several types of financial buffers such as margin, the CCP's own capital, and a default fund.

If properly structured, the default waterfall provides incentives for adequate risk management by the CCP and its participants. For extreme but plausible events, a CCP should have a recovery plan in place that allows the CCP to continue its critical operations.

Whether a CCP contributes to the development and safety of a market depends on several factors. In any case, a CCP requires a certain level of market development. CCPs have been shown to be effective infrastructures in developed countries with relatively high and sustainable income and liquid markets with, for example, narrow spreads, high trading volumes, and readily available prices. CCPs especially add value in markets in which participants actively buy and sell the same financial instrument (CPSS 2001) and credit exposures are more volatile or prolonged (Hills et al. 1999). Conversely, CCPs in insufficiently developed markets that lack market liquidity, proficiency, and effective regulation and supervision may not be able to manage risks prudently and may expose banks and other financial institutions and investors to credit risks, liquidity risks, and high operational cost.

International standards recommend that before a CCP is introduced, the benefits and costs of doing so should be evaluated (CPSS-IOSCO 2012).² The key objective of this how-to note is to support authorities in the development of a posttrade strategy and particularly in conducting a cost-benefit analysis (CBA) to evaluate whether potential benefits of a CCP outweigh the potential cost, now or within a reasonable time frame. The CBA helps authorities understand whether a CCP is superior to other clearing models, whether a CCP will contribute to the authorities' objectives of financial stability and market development, and whether the CCP will be an economically viable entity.

If the CBA concludes that for a specific market a CCP would be a beneficial and viable option, then that CCP should adopt a solid risk management framework with full collateralization of the CCP's credit exposures in line with international standards, notably the CPSS-IOSCO Principles for Financial Market Infrastructures (PFMI). If, however, the CBA concludes that a CCP would not be beneficial and viable, then alternative ways should be sought to manage counterparty credit risks in that market and a strategy should be designed to support the development of the market up to the point where the market would benefit from the creation of a local CCP or an international CCP.

The CBA framework builds on International Monetary Fund (IMF) and World Bank technical advice provided in various individual countries, and it takes into account good practices in other countries and literature.

Following this introduction, section 2 provides a typology of clearing models for contracts traded in financial markets. A snapshot of international data is provided in section 3, and additional details are provided in appendix A. Section 4 presents a theoretical framework for conducting a CBA, and section 5 presents the conclusion. Appendix B provides a hands-on methodology to conduct a CBA in practice.

² CPSS-IOSCO, *Principles for Financial Market Infrastructures*, Appendix C, Recommendation 4: "The benefits and costs of a CCP should be evaluated. Where such a mechanism is introduced, the CCP should rigorously control the risks it assumes."

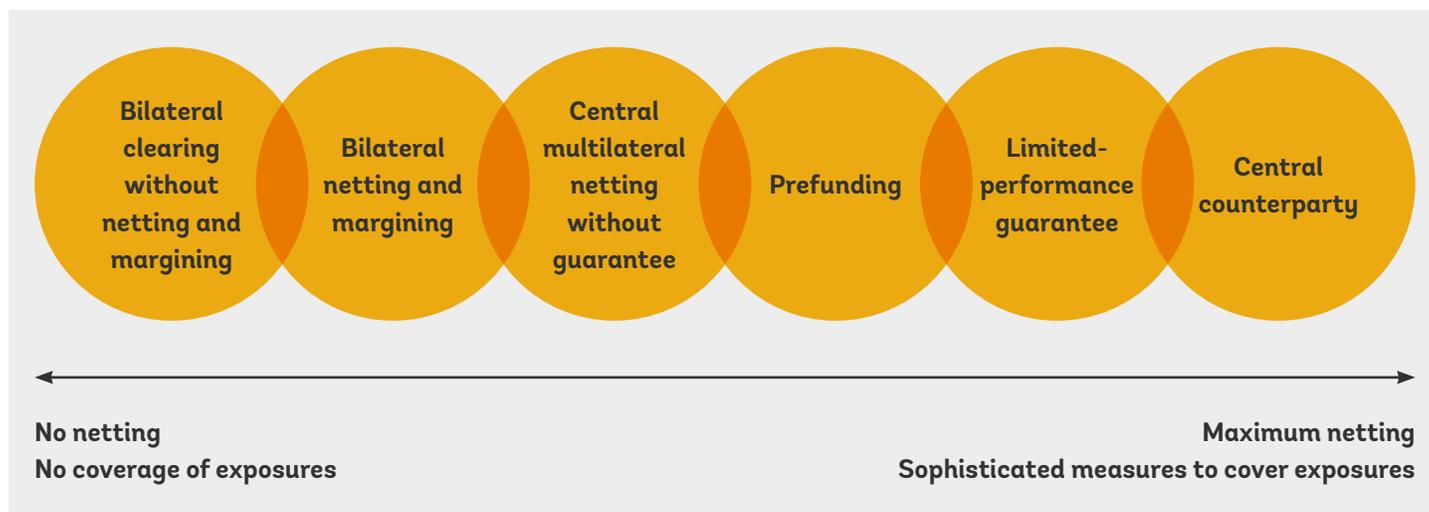


Typology of Clearing Models

A CCP is only one of the possible clearing models that are used in financial markets around the world. Figure 2.1 provides a typology of clearing models. Its six models form a spectrum from fully unsecured bilateral clearing between the counterparts in the transaction (left) to a fully guaranteed central clearing model (right). In the latter, a CCP takes over counterparty credit risk and protects itself through a comprehensive set of financial resources that are calculated and calibrated using advanced quantitative risk methodologies. Between these two ends of the spectrum, a variety of models is possible, typically providing different levels of guarantees, centrality, and efficiency.

> > >

FIGURE 2.1. - Typology of clearing models



Source: Original figure for this publication.



Unsecured bilateral clearing

The clearing model on the extreme left of the spectrum is the unsecured bilateral clearing model, in which transactions are cleared bilaterally between trading counterparties. This model comes without measures to protect counterparties against each other's potential default, such as margining. Counterparties of a defaulting trading participant are just another creditor with a claim on the defaulter's assets. This model is often used in markets characterized by nonfrequent, standardized transactions with relatively low transaction risks, such as over-the-counter (OTC) equity markets.

Bilateral margining

Bilateral clearing can also be combined with bilateral netting and bilateral margining. Bilateral netting of transactions takes place between the two counterparties of the transaction over a certain period, such as one day. Bilateral netting may take place using a standardized bilateral netting agreement—for example, the ISDA or GMRA agreement.³ The provision of margin is intended to cover credit exposures and can be either variation margin, to cover current exposures through price movements, or initial margin, to cover potential future exposures. Netting and margining reduce counterparty credit risks and protect the counterparties of the defaulter for the size of the margin and as long as transactions are not reversed. This clearing model is often used to clear bespoke transactions between two counterparties for transactions with high-risk exposures, such as in OTC derivatives and repo markets.

³ The ISDA Master Agreement is an internationally agreed-upon document of the International Swaps and Derivatives Association, Inc. (ISDA) that provides certain legal and credit protections to counterparties in OTC derivatives transactions. The Global Master Repurchase Agreement (GMRA) is a model legal agreement of the International Capital Market Association (ICMA) for counterparties in repos.

Multilateral netting

Closer to the middle of the spectrum is the exchange clearing model, which is characterized by multilateral netting of transactions and the absence of settlement guarantee. This model is often used for exchange-traded securities that settle within a short time frame (for example, T+2), where a central entity, often the stock exchange, nets the transactions on a multilateral basis. Generally, safeguards have been put in place, such as membership requirements and transaction validation, but there are no financial resources to cover the losses in case of a counterparty default. This model exposes the counterparts of the transaction to the loss of the (full) transaction value for the duration of the period that the security is not settled.

Prefunding

A clearing model that fully guarantees the settlement of the transaction is the prefunding clearing model. Prefunding stipulates that a transaction will be performed only if the gross value of assets and/or cash is available (so the full size of the transaction) and is deposited at an account of a central entity (for example, the exchange). This model is typically used in developing markets where counterparties or cleared assets (or both) have a high-risk profile. Although this clearing model provides a high certainty that a transaction will settle, it is also inefficient because it requires a high funding cost and as such hampers market development.

Limited performance model

A more efficient model is the limited performance guarantee clearing model, consisting of a central administrator of a guarantee fund, which is used to cover potential default losses without having a full set of sophisticated financial buffers in place. The central administrator is typically an exchange or central securities depository (CSD). The coverage of the guarantee fund is limited to the available funds, and it may not be sufficient under all circumstances (for example, during stressed market conditions). Non-defaulting participants would be entitled to make a claim against the guarantee fund; however, they face a credit loss to the extent that their aggregate losses exceed the size of their pro rata share of the guarantee fund (CPSS 2004). The guarantee fund is a less sophisticated risk measure than margin applied by CCPs, which is calculated to cover losses with a confidence level of, for example, 99 percent. Another difference between a guarantee fund and a CCP is that in a guarantee fund, the administrator does not have a credit exposure to a defaulting participant and typically does not assume a role in managing a default.

CCP model

A CCP is the most advanced clearing model that provides a full guarantee to trading counterparties (often through clearing members). The CCP protects itself through a sophisticated

set of financial resources, such as several types of margin, complemented by a default fund, the CCP's own capital, and recovery tools. (See box 1.1 for more information.) The literature—for example, Wendt (2015)—outlines how well-functioning CCPs can vastly improve the efficiency, transparency, and safety of the financial system, whereas CCPs that are not properly managed may severely impact the stability of the economy. The failure of a CCP may result in a systemic risk, potentially spreading losses throughout financial markets. The PFMI standards aim to ensure that financial market infrastructures (FMIs), including CCPs, are sufficiently robust and able to withstand financial shocks, and as such support financial stability. This how-to note considers that a CCP should observe the PFMI, comply with related regulations within its jurisdiction, and be subject to effective supervision and oversight.

In determining a post-trade clearing strategy, authorities may consider whether a domestic CCP should be pursued or whether clearing through an international CCP is the better option. Both options come with pros and cons (Kiff et al., forthcoming). For example, a domestic CCP provides authorities with the capacity to supervise the CCP and allows local participants to clear in the local jurisdiction and deposit local currency and securities as collateral. Several countries have built sizable local clearing operations (see box 3.1 on the introduction of a CCP for government securities in India). Nevertheless, a domestic CCP may not always be a viable option in cases of a limited number of market participants and low liquidity in certain product classes.



International data on clearing models for financial markets

The World Bank Global Payment Systems Survey (GPSS)⁴ collects information on FMIs on a biennial basis and provides detailed insights into the main characteristics of clearing models (including CCPs) across many countries.⁵ The data and information provide insight into where and how clearing models are used and how clearinghouses organize their risk management. In 2018, 41 countries⁶ reported having at least one CCP in operation, and there are about 60 CCPs active worldwide.

If a CCP has been reported to exist in a jurisdiction, the CCP does not necessarily clear all products or markets in that country. Rather, the use of CCPs can vary per type of product and market. CCPs can be active in markets for (1) cash-traded products (equities, exchange-traded funds [ETFs], and corporate and government bonds), where the CCP provides a guarantee on the settlement of trades generally executed on regulated exchanges or trading platforms; (2) exchange-traded derivatives, where the CCP clears standardized derivatives products such as single equity options, index futures, and interest rate futures; (3) OTC derivatives, which are less standardized derivatives that are traded outside of regulated exchanges; and (4) repo and classical buy-sell transactions, including lending and borrowing activities secured through (high-quality) securities.

Data from the World Bank GPSS (figure 3.1) illustrate the use of CCPs for different types of products for different countries (per income level) and regions. The figure shows that CCPs are active mostly in high-income countries with liquid financial markets, whereas alternative clearing models are in place for smaller jurisdictions and less liquid markets. These distinctions reflect that CCPs need liquid markets, where high liquidity ensures the availability of timely and accurate market prices necessary to calculate reliable margins. Liquid markets provide more netting opportunities and thus more operational efficiencies for market participants, while ensuring sufficient income for CCPs to thrive.

4 The World Bank Group launched the GPSS in 2007 to collect information on payment systems, payment services, and FMIs worldwide. Since then, the GPSS has been used by authorities and policy makers for meaningful cross-country comparisons and reforms in their national payments system (NPS) and has facilitated dissemination of best practices and international standards. In 2018, the fifth GPSS was expanded to collect information on fintech and innovative payment services, the latter focusing on the underlying innovations that enable enhanced access to and usage of transaction accounts.

5 The World Bank Global Payment Systems Survey does not capture and reflect the level of compliance with the PFMLs.

6 No low-income country provided answers to this part of the GPSS questionnaire, whereas almost 60 percent of all reporting CCPs were in high-income economies. The existence of a CCP has been declared by the relevant local regulator but has not been verified.

FIGURE 3.1. - Global use of CCPs per income level and region



Each box shows the percentage of answers for the FMIs among the jurisdictions in a group. A jurisdiction may have reported multiple FMIs. The number of responding jurisdictions and reported FMIs may differ across options. A jurisdiction may have chosen multiple options for each reported FMI.

Source: World Bank Global Payment Systems Survey.

Note: CCP = central counterparty; FMI = financial market infrastructures; OECD = Organisation for Economic Co-operation and Development; OTC = over-the-counter;

Interestingly, middle-income countries clear government bonds, repos, and corporate bonds through a CCP more often than high-income countries do. A possible explanation is that authorities in some countries actively use CCPs as tools to strengthen the risk management in these markets to promote further market development. The introduction of the Clearing Corporation of India (CCIL) is an example of this approach

(box 3.1). Conversely, high-income countries are more likely to have CCPs for equities and derivatives, reflecting the contribution of these infrastructures to the safety and efficiency of these markets. Whether a CCP is a useful infrastructure for government securities depends on several factors, as described in the next section.



BOX 3.1:

The introduction of CCIL in India

The Reserve Bank of India (RBI) initiated the decision to set up a clearing corporation to strengthen and improve the risk management framework for the clearing and settlement of debt instruments and foreign exchange (forex) transactions in India. The decision was endorsed by the government when the finance minister indicated in his budget speech (2001–02) that a clearing corporation would be set up to further develop a transparent and active debt market in general, and the government securities market in particular, and to enable settlement of forex transactions.⁷

A core committee for setting up the clearing corporation was formed at the behest of RBI. Representatives from major banks, all-India financial institutions, industry associations representing primary dealers, foreign exchange dealers, fixed-income, and money markets, and RBI were members of the committee. The committee's deliberations culminated in finalizing a blueprint for the formation of the Clearing Corporation of India (CCIL). The core committee identified six core promoters for CCIL—namely, State Bank of India, IDBI Bank Ltd. (formerly Industrial Development Bank of India), ICICI Bank Ltd., Life Insurance Corporation of India (LIC), Bank of Baroda, and HDFC Bank Ltd.⁸ CCIL was incorporated on April 30, 2001.

CCIL commenced its operations for clearing and settlement of transactions in government securities (including repos) on February 15, 2002. Acting as a CCP through novation, the CCIL provides guaranteed settlement and has put in place risk management systems and also has access to lines of credit from commercial banks.⁹ During the course of the same year, CCIL also introduced a guaranteed settlement facility for interbank spot and forward US Dollar-Indian Rupee (USD-INR) trades through novation from November 8, 2002, and has recently moved forward with clearing OTC derivatives transactions.

CCIL acting as the CCP novates the trades and guarantees settlement for transactions in the government securities market (outright and market repo and tri-party repos) subject to relevant risk mitigation measures with settlement taking place in a Delivery-versus-Payment model 3 (DVP 3) mode. Foreign exchange USD-INR market (cash, tomorrow-next, spot, and forward trades when these enter the spot window) are also novated and settled on a payment-versus-payment basis. CCIL is also licensed under the Payment and Settlement Systems Act, 2008 (and its amendments) to provide other services.¹⁰

To sum up, the RBI had a clear strategic vision to strengthen systemic and financial stability in the Indian financial markets and to mitigate systemic and counterparty credit risk in the government securities and USD-INR foreign exchange market segments. It served as a catalyst by bringing in the relevant stakeholders in a core committee and drove the process to set up a member-owned central clearing corporation. It permitted CCIL to act as a CCP in those market segments and products that had a degree of maturity and that had adequate liquidity. Finally, it exercised its powers as overseer to ensure that CCIL continues to remain compliant with the PFMI.

CCPs worldwide have put in place a range of risk management measures to manage their credit exposure (figure 3.2). These measures include capital requirements for participants, margin requirements, mark-to-market valuation, participant default procedures, loss sharing mechanisms, and the conducting of regular stress tests of adequacy of resources in case of default. To a certain extent, improvement in risk manage-

ment practices that have been observed in the past few years can be ascribed to the implementation of the PFMI. Generally, margin requirements are applied and mark-to-market valuation is performed. Also, regular stress testing appears to be a well-grounded practice worldwide, and 19 respondents apply prefunding of trades. More international data are provided in appendix A.

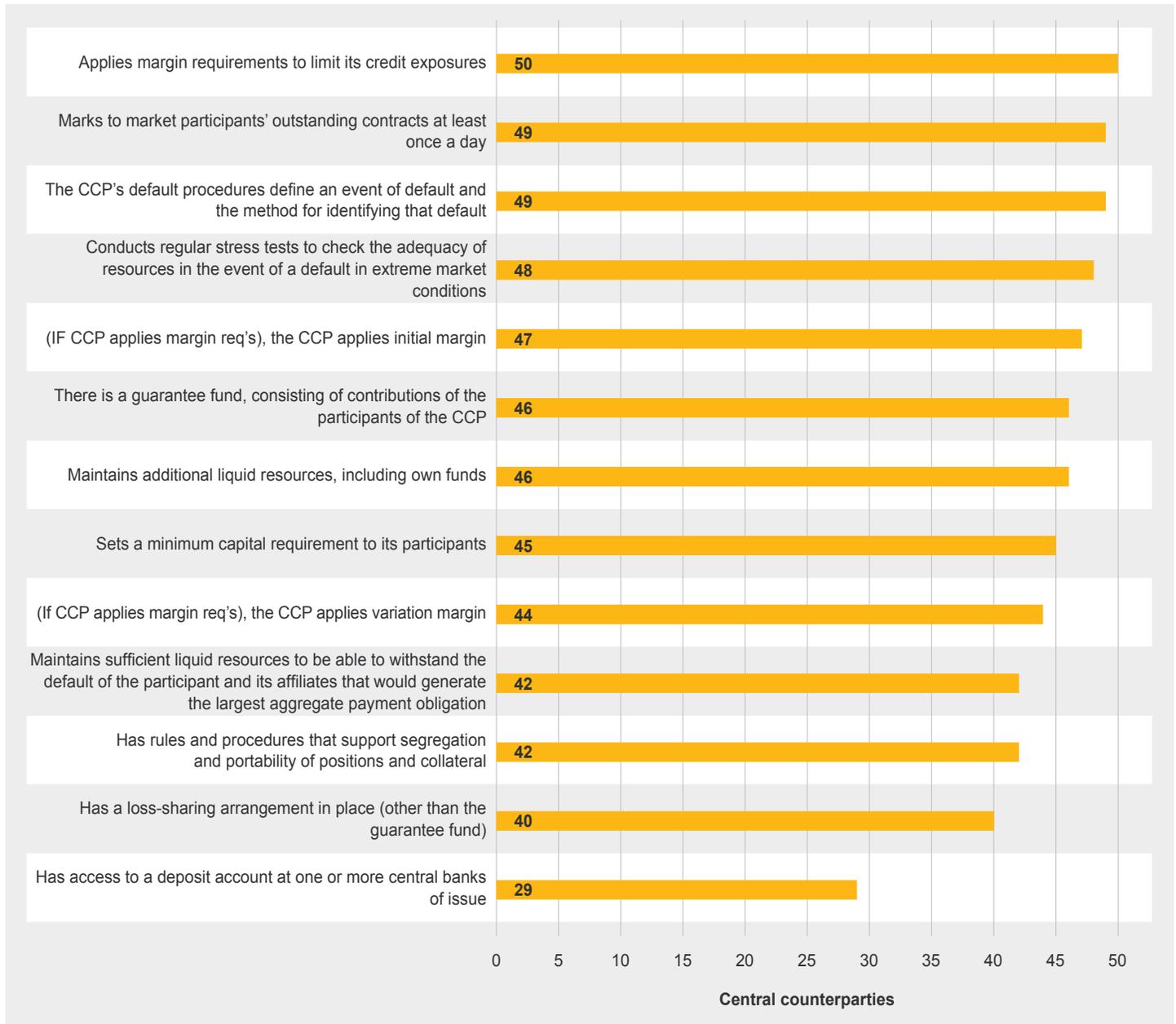
7 Government of India, ministry of finance, "Debt Market," https://www.indiabudget.gov.in/budget_archive/ub2001-02/bs/debt.htm.

8 CCIL's current shareholding is as follows: 63.2% by commercial banks; 14.0% by financial institutions; and 22.8% by primary dealers, insurance companies, nonbank financial companies, and other corporate bodies. <https://www.ccilindia.com/AboutUs/Promoters/Pages/default.aspx>.

9 Reserve Bank of India, 1. *Policy Environment Monetary and Credit Policy*. <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/32622.pdf>.

10 See CCIL Disclosures on Compliance with Principles for Financial Market Infrastructures, updated February 26, 2020, https://www.ccilindia.com/RiskManagement/Lists/QualitativeDisclosuresFiles/Attachments/10/PFMI%20Qualitative%20Disclosures%20Mar%202019_Final.pdf.

FIGURE 3.2. - CCP management of credit exposures



Source: World Bank Global Payment Systems Survey.

Section 4 presents the CBA framework that can be used to determine whether a CCP is the optimal clearing model for a specific market, or whether other clearing models are superior.



Framework for a CCP cost-benefit analysis

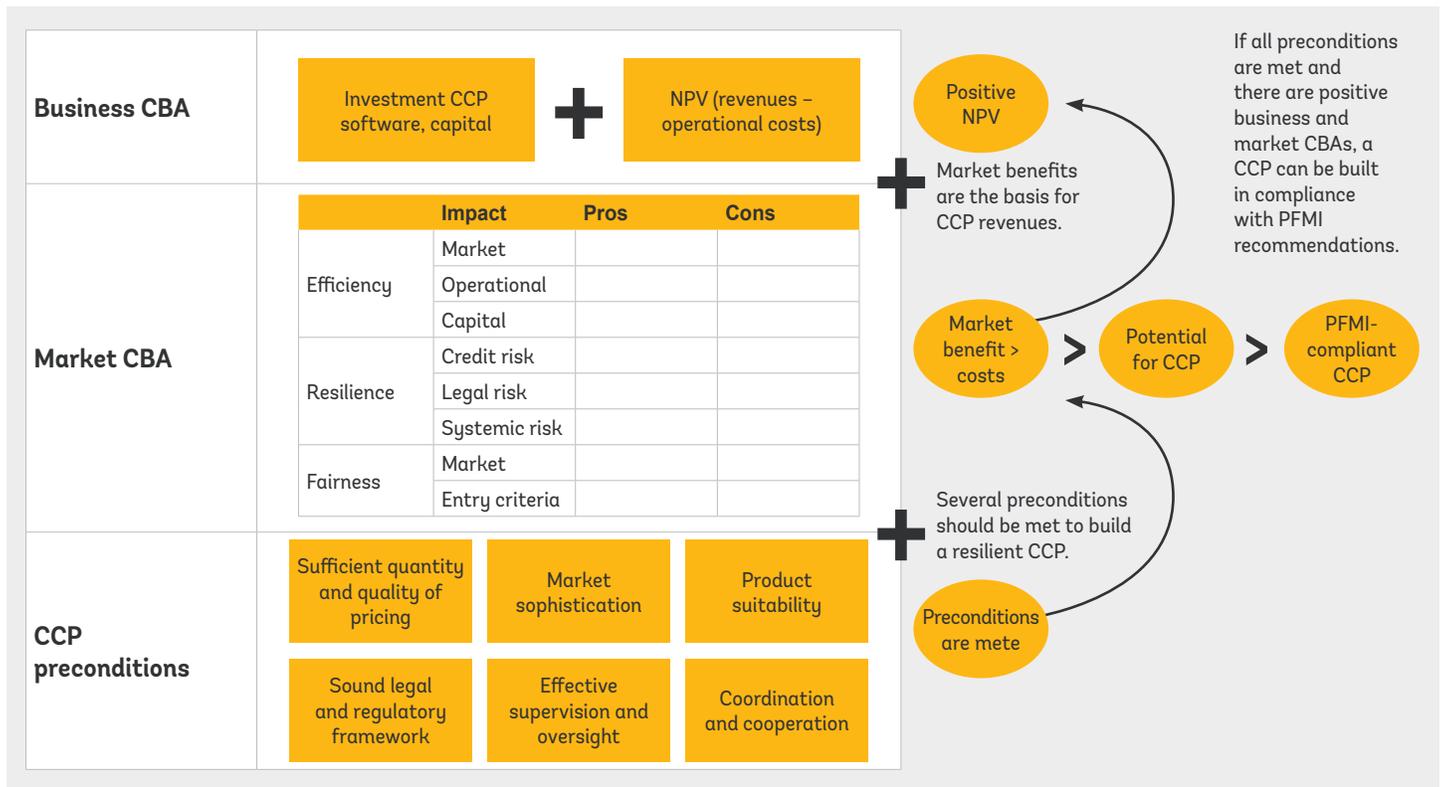
The choice for a specific clearing model is part of the overall development of a financial market. The framework presented in this section aims to support authorities, financial institutions, and other relevant stakeholders in determining whether one or more markets have the profile for ensuring a safe and efficient CCP and, therefore, whether the introduction of a CCP is the right step in the development of the market.

The framework was developed by the IMF and World Bank as part of their bilateral technical advice in several countries. The CBA framework consists of three components (figure 4.1): (1) a set of preconditions that should be met before the market is ready to set up a CCP (for example, a sound legal and regulatory framework and the availability of good-quality market prices); (2) a market CBA to determine whether the introduction of a CCP will have a positive impact on the efficiency, safety, and fairness of the market; and (3) a business CBA to determine whether the CCP would generate sufficient revenues to conclude that there is a business case for a CCP. If an analysis of each component concludes positively, then the CCP should ensure that it is PFMI compliant. The last step is not part of the CBA but rather a verification that the CCP adopts governance and risk management rules, procedures, and practices that are in line with international standards.



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FIGURE 4.1. - Cost-benefit analysis framework for the introduction of a CCP



Source: Original figure for this publication.

Note: CBA = cost-benefit analysis; CCP = central counterparty; NPV = net present value.

CCP Preconditions

A first set of preconditions for a safe and efficient CCP comprise the availability of a **sound legal and regulatory framework, effective supervision and oversight, and coordination and cooperation among all relevant stakeholders.**

The development of capital markets requires a robust legal and regulatory environment (Carvajal and Bebczuk 2019). Critical to the safe and efficient functioning of a CCP is that the legal and regulatory framework governs CCP activities. This is the foundation for relevant parties to define the rights and obligations under contractual agreements. The legal and regulatory framework should cover, among other things, collateral arrangement for collateral posting, protection and legal enforceability of (local and international) netting arrangements, the potential default management procedures, and CCP loss allocation. If the legal basis for a CCP's activities and operations is inadequate, uncertain, or lacks clarity, then the CCP, its participants, and its participants' customers may face unintended, uncertain, or unmanageable credit, liquidity, or operational risks.

Effective regulation and supervision of a CCP are critical to ensure that the CCP addresses public interests. It is important that the relevant international standards, the PFMI, are appropriately reflected in the legal and regulatory framework.¹¹ Supervision should be strong, with a focus on the adequacy of the CCP's governance structure and financial buffers to manage credit, liquidity, and operational risks. Operational resiliency of the CCP is of critical importance, as is an understanding of the CCP's interdependencies and interconnections to manage potential spillover risks to banks and other financial institutions and markets. Supervisors should have appropriate powers, staffing, and supervisory and enforcement tools. Where multiple authorities are involved, cooperation is essential to avoid gaps and inconsistencies in the regulatory and supervisory approach. Authorities should also have crisis management arrangements in place to facilitate effective and timely communication among authorities and market participants, which may help to avoid or reduce the size of financial losses during crisis events.

The successful implementation of a CCP also requires the involvement of all relevant players (CSDs, stock exchanges, banks, brokers, dealers, central banks, securities regulators, and others) in all phases of the development and decision-making process.

In addition, there are specific preconditions that relate to a CCP's ability to perform proper risk management in relation to cleared positions. These are **timely and reliable market prices, a minimum level of market sophistication, and product suitability.**

A market should be able to provide the CCP with timely and reliable price data. Access to daily valuation prices of products is a minimum to perform a mark-to-market valuation of participants' portfolios, which is the starting point for appropriate risk management. A historical range of reliable end-of-day prices is needed to set initial margin rates and define stress-testing scenarios, which are critical to establish sufficient buffers that protect the CCP against the potential failure of one or more participants. The availability of intraday prices is highly preferable, as it provides for the possibility to adjust the margin coverage during the day.

Market participants should have the sophistication to perform active risk management toward the CCP. Participants should have the capacity, both in numbers and in knowledge, to contribute to the safety of the CCP, and they should understand the balance between safety and costs of a CCP. They benefit from a safe CCP that operates properly and does not have to call for capital to cover unexpected losses. These benefits should be balanced against the daily ongoing cost of transaction fees and the opportunity costs of collateral. Participants may actively engage with the CCP as board members, as participants in a CCP risk management committee, or otherwise through CCP working groups. If the risk governance of a CCP is not appropriate, the CCP could guarantee inappropriate products or could calculate margins that are too low compared with the risk exposures, implicitly exposing the overall market or taxpayers (or both) to the residual exposure.

Finally, assets to be cleared by the CCP should be sufficiently standardized and fungible in order to be suitable for a CCP guarantee. Only then can the CCP perform netting, thereby offsetting positions in identical contracts and allowing for a reasonable amount of margin to be called. Also, the characteristics of the product should allow the CCP to define appropriate risk measures to cover the underlying exposures (for example, too-complex products are difficult to value, making undercollateralization or overcollateralization more likely) (Pirrong 2011).

¹¹ The legal and regulatory framework and supervision/oversight can be developed over time. It is recommended that at the time of the CBA, draft regulations and an implementation plan are available to determine whether the preconditions are likely to be met. The final implementation of the regulations and supervision/oversight can take place during the last step (that is, the PFMI assessment before the introduction of the CCP).

Market Cost-Benefit Analysis

The second component of the CBA framework—the market CBA—analyzes whether a CCP would contribute to the smooth-functioning of the market for which the CCP would be introduced. A well-functioning market is defined as a market that effectively meets the financial needs of its users, ensures investor confidence, and supports sustainable economic growth. To that purpose, the market CBA evaluates how the introduction of a CCP would impact the **efficiency, safety, and fairness** of the market, which are key objectives of securities regulators (IOSCO 2017).

An **efficient** financial system allocates scarce financial and other resources to the greatest possible benefit of market participants, supporting growth, productivity, and prosperity. Clearing models impact the use of capital through position and exposure netting, as well as the allocation of default losses, and as such may increase or decrease market efficiency.

A safe financial system should be able to adjust to changing circumstances while continuing to provide its core economic functions, even during severe shocks. Institutions in distress should be resolvable with minimal costs to investors, depositors, shareholders, taxpayers, and the real economy. Different clearing models have different consequences for the safety and soundness of a market. Bilateral clearing models without netting and collateral do not mitigate risks, whereas a bilateral model with netting and collateral can mitigate credit risks to a high degree. A sound CCP can strongly contribute to mar-

ket transparency and a reduction in credit and liquidity risks, whereas a poorly operated CCP can be a source of systemic risk propagation (for example, through procyclicality of margin or through the use of non-prefunded clearing member contributions in times of stress).

Fair treatment occurs where participants act with integrity, honesty, transparency, and nondiscrimination. A market economy operates more effectively when participants enter into transactions with the confidence that they will be treated fairly. In a fair financial system, clearing models have fair and open access criteria and provide incentives to market participants to pursue safe operations, protect customer assets, adequately manage their risks, and more generally reduce negative externalities related to clearing.

The purpose of the market CBA is to assess whether the efficiency, safety, and fairness of the market indeed improve through the introduction of a CCP. Comparing multiple clearing models—for example, the CCP model and a bilateral clearing model with netting and margining—allows for assessing whether a CCP is the best model for a specific market, or whether other models create a better-functioning market. In case there is a choice between an international CCP and a local one, the aforementioned criteria could also be applied. Table 4.1 outlines the cost and benefits of a CCP compared with a bilateral clearing model.

TABLE 4.1. - Market CBA for a CCP compared with a bilateral clearing model

	Impact on	Benefits	Cost
Efficiency	Market	CCP supports an anonymous market, which improves market liquidity.	Additional clearing fees and collateral costs related to clearing (although netting may reduce collateral cost)
		Reallocation of losses and capital through netting and the CCP guarantee, which improves market efficiency	
		A CCP may attract foreign investors.	
Safety	Operational cost	Multilateral netting reduces the number of settled transactions, which reduces settlement cost.	Additional operational cost related to CCP systems, such as IT systems and cost of reconciliation with the CCP
	Capital costs	Multilateral netting reduces balance sheet exposures, lowering capital cost.	Margin and default fund deposits create opportunity costs
	Credit risk	Netting and one creditworthy counterparty (the CCP) reduces overall credit risk, that covers exposures through a set of sophisticatedly calculated financial resources.	Subsidization of lower-rated CCP participants
	Liquidity risk	Continuation of critical operations in case of a default event supports market trust and market liquidity.	CCP may call for large amounts of (intraday) margin during periods of increased market volatility.
	Systemic risk	Systemic risk manager resolving defaulter's portfolios	CCP is single point of failure. If CCP manages risk insufficiently/ not in line with PFMI, it could be a propagator of systemic risk through failures and procyclical margin calls
Fairness	Entry criteria to the CCP	Transparent entry criteria for CCP	Generally, only high-rated and sophisticated market participants can participate directly; other market participants join indirectly through the direct participants.

Source: Original table for this publication.

Note: CCP = central counterparty; IT = information technology; PFMI = Principles for Financial Market Infrastructures.

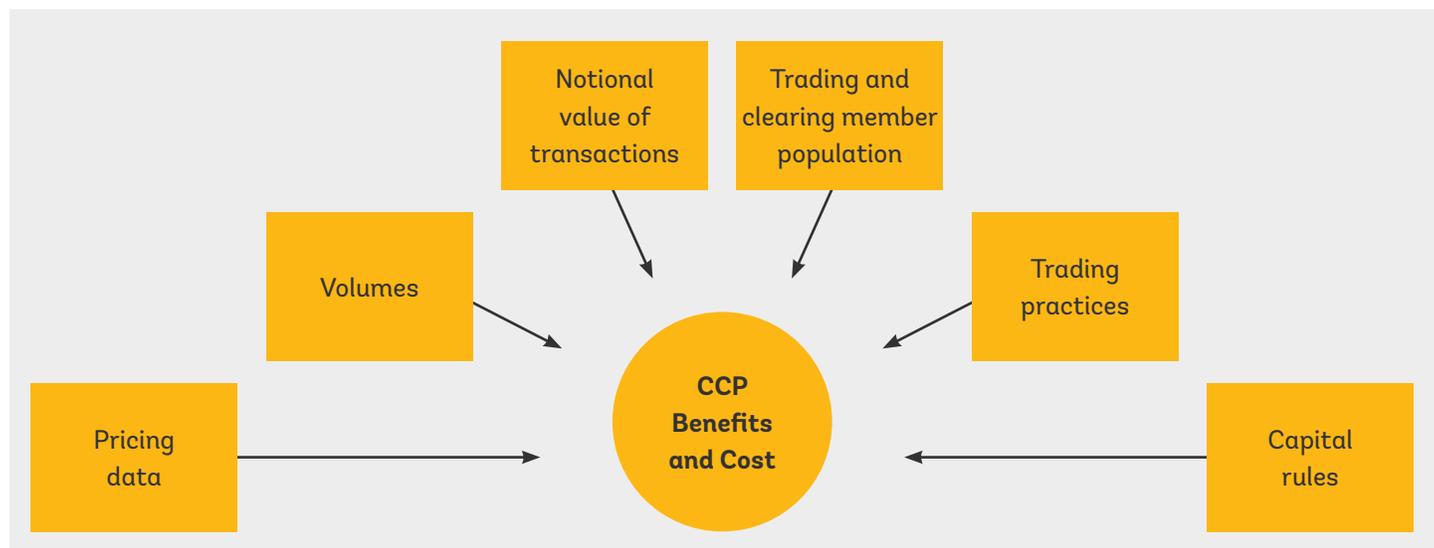
The market CBA requires that the impact of a CCP on the efficiency, safety, and fairness of the market is analyzed and compared with the impact of alternative clearing models. Appendix B provides a practical guide for such an analysis. The market CBA should be conducted for every type of product (cash, bonds, derivatives, and so forth), since important features may differ per market, such as netting opportunities and availability of prices. Also, the risk appetite of market participants may differ per market.

A market CBA consist of both **qualitative and quantitative elements**. Table 4.1 gives an example of a quantitative analysis. The quantitative analysis is useful to calculate the potential collateral cost that would come with a specific clearing model. It involves assumptions on the netting factor, potential market volatility, and liquidity (figure 4.2) using data such as transaction flows, market prices, number of clearing members, trading practices, and capital adequacy rules. The translation of quantitative input data to actual positions and netting ratios is not straightforward and depends on the trading practices and activity of members.



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FIGURE 4.2. - Quantitative input factors for the market CBA



Source: Original figure for this publication.
 Note: CCP = central counterparty.

In many developing markets, a quantitative assessment is difficult because the quantity and quality of market prices are insufficient to calculate the size of financial buffers that the CCP should keep. For example, trading platforms often do not function as central platforms where supply and demand meet but rather collect OTC prices throughout the day. The lack of market prices provides an insufficient basis for a CCP's risk management and can lead to additional losses in cases where the CCP needs to wind down a defaulter's position.

Conversely, the introduction of a CCP may positively contribute to market liquidity and thus to the quality and quantity of market prices, creating a chicken-and-egg problem that needs to be addressed through a comprehensive market development program. As an example, the central bank and securities market regulator in Ukraine have been actively developing their post-trade strategy and policies for the capital market in Ukraine to address this problem through development of alternative clearing models and general market reforms (box 4.1).



BOX 4.1:

Ukraine: Example of an alternative clearing model

Within the Ukrainian financial market, the settlement center (SC) provides clearing services for several securities exchanges, using a prefunding clearing model in which the SC becomes the counterparty to all trades. The model allows for novation and ensures continuous market access, even under stressed market conditions, which are crucial features for market participants in Ukraine.

The Ukrainian post-trade infrastructure is a closed system, in which each investor has to sign a contract with a broker, who is a participant of the SC. Before the execution of the trade, the investor has to deposit the cash (if he or she is a buyer) to the account of his or her broker, who notifies the SC clearing system and exchanges. If the investor is the seller, the broker gives an instruction to the selling investor's custodian to block the securities on the securities account in the central securities depository. Following the prefunding of the buyer's and seller's accounts, the trade is executed on one of the exchanges and the SC becomes the counterparty to the trade. On the same day, the SC sends the settlement instructions to the central securities depository for final settlement.

Although this model is very safe, it comes with a high funding cost. Therefore, the relevant public and private stakeholders have investigated the possibilities of introducing a central counterparty (CCP) for the securities or derivatives market (or both) in Ukraine. A CBA has been performed to verify whether the benefits of a potential CCP would outweigh the costs and potential downsides.

The main conclusion of the analysis is that a CCP is currently not a viable solution for the Ukrainian markets. Some of the preconditions for a CCP are not in place (for example, the legal framework needs further reforms). Also, market volumes do not support netting efficiencies to materialize, and they are too low to provide reliable prices for the CCP's risk management function.

However, there is a possibility of improving the current model, and alleviating some of its drawbacks, by introducing a limited-performance guarantee clearing model for a limited number of securities with higher liquidity. This model supplements the prefunding model that still exists for the less liquid securities. The limited-performance guarantee model would require a relatively low level of information technology and business investments, while reducing the funding requirements for market participants. A market-wide road map has been initiated to support these reforms. The road map is endorsed by the relevant regulatory authorities, the National Securities and Stock Market Commission, and the National Bank of Ukraine.

Business Cost-Benefit Analysis

The third component of the CBA framework is the business CBA, which aims to analyze whether the CCP can generate sufficient revenues over time to cover its business-related costs and ensure a positive return on capital. The business CBA reflects that the introduction of a CCP is also a new business initiative, which requires sustainable long-term revenues. A generally accepted method, in corporate finance literature, to assess the business viability of an investment is the net present value (NPV), which evaluates whether expected future cash flows discounted at an appropriate rate are sufficient to offset the relevant investments. The positive cash flows are the (additional) revenues generated by (new) products and the outflows related to investments in information technology (IT) systems and other operational costs. Furthermore, a new CCP requires capital to meet regulatory requirements, although capital costs are relatively low.

A positive outcome of the business CBA indicates that there is a basis for the CCP to generate revenues. CCP revenues are typically generated through several types of fees—for example, membership fees and transaction fees. Also, fees may be levied on deposited collateral, or a spread may be added on top of an interbank rate as remuneration for cash deposits. If a CCP requests more fees than there are benefits available to clearing members, either the clearing members will not clear at the CCP or—in a case of mandatory clearing and/or insufficient alternatives—the CCP will not contribute to an efficient market. In some cases, and if legally allowed, CCP income may benefit from the bundling of services (for example, by also offering trade repository services).

The business CBA should include a realistic estimation of potential revenues and related costs to ensure low business

risks. The costs of running a CCP are generally fixed costs, whereas the revenues are variable and dependent on the clearing activity. A CCP cannot be a stable company without sufficient income to cover the relevant costs plus a profit margin for the shareholders of the CCP.

The discount rate that is used to determine the NPV of the investment should reflect the opportunity costs and can vary depending on the type of investor. A private investor in the CCP's capital may use a weighted cost of capital or a required rate of return to satisfy equity and debt investors. For a public investor, the best approach for a financial discount rate is to consider the return lost from the best alternative investment. For example, within the European Union, a proxy discount rate of 4 percent (in real terms) is used for infrastructure investments (European Commission 2014). This proxy should be adapted to the specifics of the relevant market.

A key success factor in introducing a viable CCP is to align the parties that use the CCP's services with those parties willing to invest in the CCP as a company. An exchange or trading platform that invests in a CCP may generate additional trading revenues because the introduction of the CCP makes the market safer and more efficient. Clearing members may invest in the CCP and simultaneously profit from the efficiency gains. A public investor in a CCP (for example, the government or central bank) could value some of the social benefits of a CCP that are not reflected in the relevant cash flows, such as the CCP's contribution to the development of the market, and could include these externalities by requiring a lower rate of return. Table 4.2 illustrates the benefits of the CCP to different types of stakeholders.

> > >

TABLE 4.2. - Potential benefits of a CCP and main beneficiaries

	Impact on	Potential benefits	Who?
Efficiency	Market	<ul style="list-style-type: none"> • Lower bid/ask • Higher transaction volumes • Easier to raise capital 	<ul style="list-style-type: none"> • Investors • Exchanges and brokers • Issuers
	Operational	<ul style="list-style-type: none"> • Lower settlement costs 	<ul style="list-style-type: none"> • Banks and financial intermediaries
	Capital costs	<ul style="list-style-type: none"> • Lower capital costs 	<ul style="list-style-type: none"> • Banks and financial intermediaries
Safety	Credit risk	<ul style="list-style-type: none"> • Credit enhancement 	<ul style="list-style-type: none"> • Lower-rated banks and financial intermediaries
	Legal and liquidity risk	<ul style="list-style-type: none"> • Certainty of transactions 	<ul style="list-style-type: none"> • Investors, banks, and financial intermediaries
	Systemic risk	<ul style="list-style-type: none"> • Improved crisis management • < probability bailout 	<ul style="list-style-type: none"> • Whole marketplace • Government and regulators
Fairness	Market entry criteria	<ul style="list-style-type: none"> • More fair access to markets 	<ul style="list-style-type: none"> • Investors
	Entry criteria	<ul style="list-style-type: none"> • Membership criteria 	<ul style="list-style-type: none"> • Higher-rated banks and financial intermediaries

Source: Original table for this publication.

Finally, the establishment of a CCP for one product may create opportunities to clear additional products within the same entity, which could strengthen the CCP's business case. As illustrated in box 4.2, the potential to clear additional products could be an incentive to make the investment in a CCP for a

relatively small derivatives market. However, such an investment should not harm financial stability. There should be guarantees to cover the long-term business risks (for example, the CCP should comply with the PFMI).¹²

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BOX 4.2:

Example of how the CBA framework supported frontier market development

A developing country¹³ with a relatively developed banking sector, market infrastructure, and regulatory framework initiated a program to further develop its domestic capital markets in order to strengthen its role as a financial hub in the region. As part of the program, the ministry of finance, together with the stock exchange, Financial Market Infrastructures, and other market players set plans in motion, such as the establishment of a regulated derivatives exchange and a local central counterparty (CCP) to support anonymous derivatives trading.

The local central bank used the cost-benefit analysis (CBA) framework presented in this note to review whether the introduction of the derivatives CCP was consistent with its mandate to preserve financial stability. The framework facilitated the discussions with relevant stakeholders on whether the preconditions for setting up the future CCP were met. In addition, the framework helped to identify areas of reform, assess the impact of a potential CCP on systemic risk and market efficiency, and determine the economic viability of the future CCP.

The following areas for reform were identified: (1) the oversight activities in relation to the CCP project should be intensified, (2) gaps in the legal and regulatory framework need to be addressed, and (3) market developments would need to be initiated to improve the liquidity of underlying and over-the-counter derivatives markets.

The conclusion of the exercise was that there are only limited economic and market benefits of a CCP for derivatives markets. However, it became also clear that several other markets would benefit from CCP clearing, and that a multiasset CCP (potentially covering cash-traded equities and bonds) might meet more prerequisites and conditions for safety, efficiency, and viability. A follow-up CBA is needed to determine what combination of asset classes should optimally be included in the scope of the future CCP.

12 There are interactions between the three elements of the CBA framework. First, if not all preconditions are in place or the CCP cannot become PFMI compliant, this will also negatively impact the safety of a CCP. In this case, it is likely that the market CBA for a CCP will be negative as well because of systemic and credit risk concerns. Also, the benefits recognized through the market CBA will be the input for the business CBA. However, if the CCP is a (quasi) monopolist and there is mandatory clearing, the CCP has the possibility of charging fees to ensure a positive NPV without market benefits. In this case, the fees of the CCP will negatively impact the market CBA through a negative assessment of the impact of a CCP on market efficiency.

13 The country requested to be included in this paper on an anonymous basis.

Final Implementation and PFMI Compliance

In principle, the benefits of a CCP outweigh the cost (1) if there is a positive business CBA, (2) if there is a positive market CBA, and (3) when preconditions are met. However, to ensure that the CCP is a sustainable solution and delivers on its promises, a final element of the CBA framework entails compliance with the PFMI. Also, investors may use compliance with the PFMI as a condition before investing in a CCP.

Compliance with the PFMI ensures that the governance, rules, procedures, and practices are in line with international standards. This provides investors, including foreign investors, with comfort that risks are properly identified, mitigated, and managed. It requires the CCP and its supervisors to address questions related to, among other things, (1) credit risk and how margin and other financial resources are calculated and collected; (2) liquidity risk—that is, whether the CCP generates sufficient liquidity to manage the largest operational and default liquidity exposures; (3) default management; (4) recovery measures and how the CCP manages in the event that its regular resources are insufficient; (5) governance and whether proper checks and balances are in place to control the risk exposures of the CCP toward the clearing members and other stakeholders; and (6) operational risk to ensure that

the CCP operates in such a manner that operational and investment losses are minimized and that potential losses are adequately covered by capital or other resources.

Typically, the operator of a CCP performs a PFMI self-assessment and assesses its design against the relevant principles for CCPs. The assessment may identify weaknesses or risks in the legal framework, governance, risk management framework, or operational procedures and result in measures taken to mitigate these risks. The self-assessment then serves as a basis for a PFMI assessment by the supervisory and oversight authorities of the CCP based on the most up-to-date information.¹⁴ It also helps ensure that the CCP complies with local regulations.

CCP supervisors and overseers may condition the introduction of a CCP on a positive CBA in combination with a PFMI assessment that concludes that the CCP is generally in compliance with the principles. Box 4.2 presents an example of a combined CBA and PFMI assessment in which the financial stability risks relating to a planned CCP in a frontier country were assessed. Once a CCP is launched, the actual functioning of the CCP can be assessed using the PFMI.

¹⁴ This information may include implemented risk measures, regulations, and any market developments resulting from the CBA.



Conclusion

The CBA framework proposed in this paper can assist authorities in defining their posttrade strategy and policies, in particular with regard to the introduction of a CCP. A CCP is often seen as a panacea to solve specific market issues and attract foreign investors. However, a CCP may not be the appropriate solution for each market, particularly if the market is insufficiently liquid or has a low level of sophistication.

The CBA framework provides a comprehensive approach to answer the following questions:

- Are preconditions met for the introduction of a CCP? (For example, is the market sufficiently liquid to allow for reliable margin calculations, and are market activities governed by a sound legal and regulatory framework?)
- Will a CCP improve the smooth functioning of the market compared with the current clearing model? Does a CCP contribute to the safety, efficiency, and fairness of the market it services, or are alternative clearing models a better clearing solution for the market?
- Is there a positive business case for the CCP to ensure that it is a viable company in the medium to long term?

Application of the framework results in answers to these questions. Positive answers to all three questions means a green light for the introduction of a CCP for a specific market. A negative answer to one of more questions indicates that a market is not (yet) sufficiently mature to support a safe and efficient CCP.

In the latter case, the CBA provides clues to further develop the market to a level where the overall benefits of a CCP outweigh the costs and potential downsides. Generally, a first step is to prepare a market development road map to ensure that the preconditions of the CBA framework are in place. Those preconditions—for example, a sound legal and regulatory framework—will contribute to a sound CCP that contributes to a well-functioning market, which in turn positively contributes to a solid business case.

The framework can also be used in cases in which a CCP has already been established. In that context, the framework is a tool to assess the CCP's setup, including its risk framework. It is a tool to check whether the preconditions for a CCP are in place. (If they are not, plans should be made to address any deficiencies.)

The development of a CCP is often a classic chicken-and-egg problem, where improvements in market liquidity are required before a CCP can be pursued, whereas an improvement in market liquidity would follow the introduction of a CCP. This dilemma can be addressed by developing financial markets gradually and, in each stage, implementing a clearing model that fits the level of development of the market. For each new clearing model, with ultimately the implementation of a CCP, an analysis should confirm that the impact of the new clearing model on the safety, efficiency and fairness of markets is positive compared with the current status. Another option is to allow domestic financial institutions to use an international CCP under certain conditions—for example, that this CCP complies with international standards and that authori-

ties share information under a memorandum of understanding (Kiff et al, forthcoming).

So far, the IMF and World Bank have used the CBA framework in their technical assistance to developing markets. The framework can also be applied to developed markets. A developed market probably meets many or all of the preconditions as required in the CBA framework. However, for the implementation of a central clearing mandate (for example, for standardized OTC derivatives), the liquidity of the cleared products is relevant, as is product suitability, which refers to fungibility and the CCP's capacity to calculate appropriate margins to ensure financial stability.



References

Bliss, Robert, and Robert Steigerwald. 2006. “Derivatives Clearing and Settlement: A Comparison of Central Counterparties and Alternative Structures.” *Economic Perspectives* 30 (4): 22–29.

Carvajal, Ana Fiorella, and Ricardo Bebczuk. 2019. *Capital Markets Development: Causes, Effects, and Sequencing, A Literature Review*. Washington, DC: World Bank.

Cox, Robert, and Robert Steigerwald. 2018. “A CCP Is a CCP Is a CCP.” *Journal of Financial Market Infrastructures* 6 (4), 1–18.

CPSS-IOSCO. 2012. *Principles for Financial Market Infrastructures*. <https://www.bis.org/cpmi/publ/d101a.pdf>

CPSS-IOSCO (Committee on Payment and Settlement Systems). 2001. *Recommendations for Securities Settlement Systems*. Basel: Bank for International Settlements.

CPSS-IOSCO (Committee on Payment and Settlement Systems). 2004. *Recommendations for Central Counterparties*. Basel: Bank for International Settlements.

Domanski, Dietrich, Leonardo Gambac, and Cristina Picillo. 2015. “Central Clearing: Trends and Current Issues.” *BIS Quarterly Review*, December 2015: 59–76

Duffie, Darryl, and Haoxiang Zhu. 2011. “Does a Central Clearing Counterparty Reduce Counterparty Risk?” *Review of Asset Pricing Studies* 1 (1): 74–95.

European Commission. 2014. *Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014–2020*. Brussels: European Commission.

Hills, Bob, David Rule, Sarah Parkinson, and Chris Young. 1999. “Central Counterparty Clearing Houses and Financial Stability.” *Financial Stability Review*, June 1999: 122–34.

IOSCO (International Organization of Securities Commissions). 2017. “Objectives and Principles of Securities Regulation.” <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD561.pdf>.

Kiff, John, Alessandro Gullo, Cory Hillier, Panagiotis Papapaschalis, and Froukelien Wendt. Forthcoming. "Applying the Central Clearing Mandate in Advanced and Emerging Markets." IMF Working Paper, International Monetary Fund, Washington, DC.

Pirrong, Craig. 2011. "The Economics of Central Clearing: Theory and Practice." ISDA Discussion Paper Series, Number One. <https://www.isda.org/a/yiEDE/isdadiscussion-ccp-pirrong.pdf>.

Ripatti, Kirsi. 2004. "Central Counterparty Clearing: Constructing a Framework for Evaluation of Risks and Benefits." Bank of Finland Research Discussion Paper 30/2004, Bank of Finland, Helsinki.

Wendt, Froukelien. 2015. "Central Counterparties: Addressing Their Too Important to Fail Nature." IMF Working Paper 15/21, International Monetary Fund, Washington, DC.



Appendix A. World Bank data on CCPs around the world

On a biennial basis, the World Bank Global Payment Systems Survey collects information on financial market infrastructures (FMI), including CCPs, and provides detailed insights on the main characteristics of CCPs across many countries but does not capture and reflect the level of compliance with the PFMI. In 2018, 41 countries¹⁵ reported having at least one CCP in operation. Answers were received by 55 to 60 CCPs as identified by the local respondents (depending on the question), some of those CCPs serving markets in several jurisdictions. The CCPs operating in more than one jurisdiction were mainly found in high-income OECD economies.

The majority of CCPs clear exchange-traded derivatives, using novation, and provide multilateral netting facilities (figure 3.1). Regarding types of assets cleared, 68 percent of CCPs clear exchange-traded derivatives whereas 41 percent clear OTC-traded derivatives, the latter being significantly more common in high-income economies than in upper-middle-income and lower-middle-income economies. The majority of CCPs also clear cash products such as corporate equities (61 percent) and corporate bonds (54 percent). It is worth noting that the various asset classes are not mutually exclusive, which in practice means that the same CCP can clear both types of derivatives, and/or certain derivatives and cash products, and/or several types of cash products. The process of novation is followed by 88 percent of CCPs, whereas open offer is followed by 27 percent of CCPs. Novation is adopted across all regions and all income levels of economies. Netting benefit is one of the outcomes of participating in a CCP arrangement. Accordingly, 89 percent of the CCPs globally provide multilateral netting facilities. Five CCPs in high-income OECD economies and one in the South Asia region guarantee the settlement of other FMIs.

In terms of ownership and governance, it appears that the majority of CCPs are owned by the private sector and that PFMI recommendations regarding governance are, to a large extent, implemented (figure A1.1). Globally, 75 percent of the CCPs are fully owned by the private sector, this being more evident in high-income OECD economies (92 percent) and in the Latin America and the Caribbean (LAC) region (82 percent). In comparison, only 10 percent of CCPs globally are fully owned by the public sector. The remainder are jointly owned by the private and public sectors. Almost all CCPs (53 out of 54, or 98 percent) indicated that they have documented governance arrangements, with 91 percent indicating that these governance arrangements include

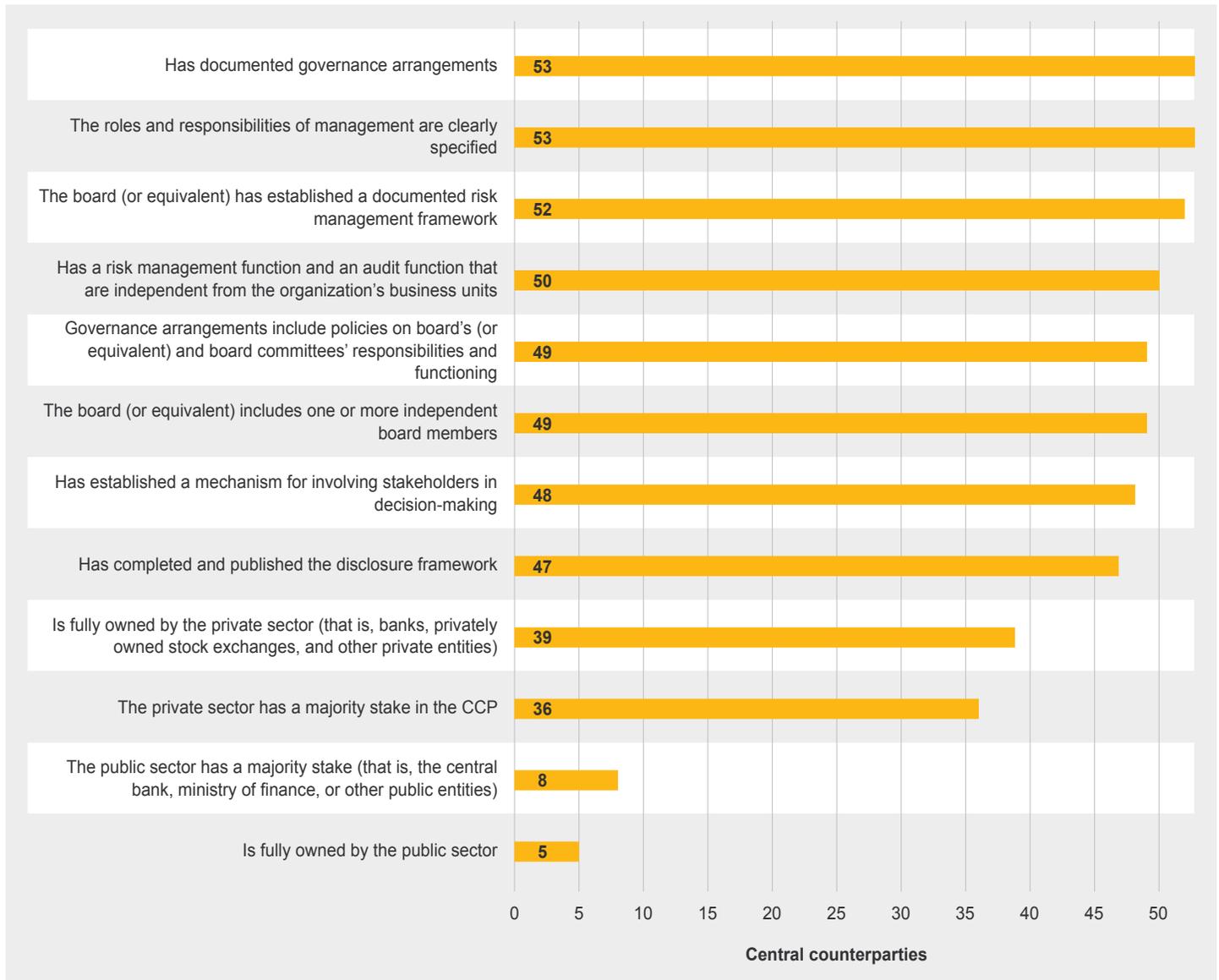
15 No low-income country provided answers to this part of the GPSS questionnaire, whereas almost 60 percent of all reporting CCPs were in high-income economies.

policies on the responsibilities and functioning of the board and its committees. Further, 91 percent of the reporting CCPs have one or more independent board members. The regional analysis indicates that, with the exception of 4 CCPs in the LAC region, the CCPs in all other regions have a risk management function and an audit function that are independent from

the CCPs' business units. Eighty-nine percent of the CCPs have established a mechanism for involving stakeholders in the decision-making process. The PFMI Disclosure Framework has been completed and published by 87 percent of the CCPs, with most exceptions being in CCPs in the LAC region.

> > >

FIGURE A.1. - CCP governance and ownership



Source: World Bank Global Payment Systems Survey.

The membership of CCPs is formed mainly by commercial banks, broker-dealers, and other financial institutions. Globally, 80 percent of CCPs provide membership to commercial banks, 83 percent to brokers-dealers, and 72 percent to other financial institutions. The membership type could vary depending on whether the member can: (1) enter transactions directly with the CCP (type “a”); (2) act as a direct settlement member, settling transactions on its own account (type “b”); (3) act as a direct settlement member and settle transactions on its own account and also on behalf of other participants (type “c”); and (4) settle transactions indirectly through another member (type “d”). In this regard, about 50 percent of the commercial banks and broker-dealers globally have type “c” membership. Another 16 percent of commercial banks and 11 percent of broker-dealers have type “b” membership. In the case of other financial institutions, 38 percent can enter transactions directly with the CCP (that is, type “a” membership), but only 32 percent have type “c” membership.

A key measure of liquidity risk management is capacity to maintain sufficient liquid resources to be able to withstand the default of the participant and its affiliates that would generate the largest aggregate payment obligation. This is observed in 42 reporting CCPs (out of 51 that answered this specific item, or 82 percent). The stress testing of resources in case of default is performed by the vast majority. Further, the existence of a guarantee fund made up with participant contributions was reported by 46 (85 percent). Only 29 percent of CCPs in lower-middle-income economies have this guarantee fund, compared with 96 percent (25 out of 26) in high-income OECD economies. Rules and procedures that support segregation and portability of collateral were reported by 42 CCPs.

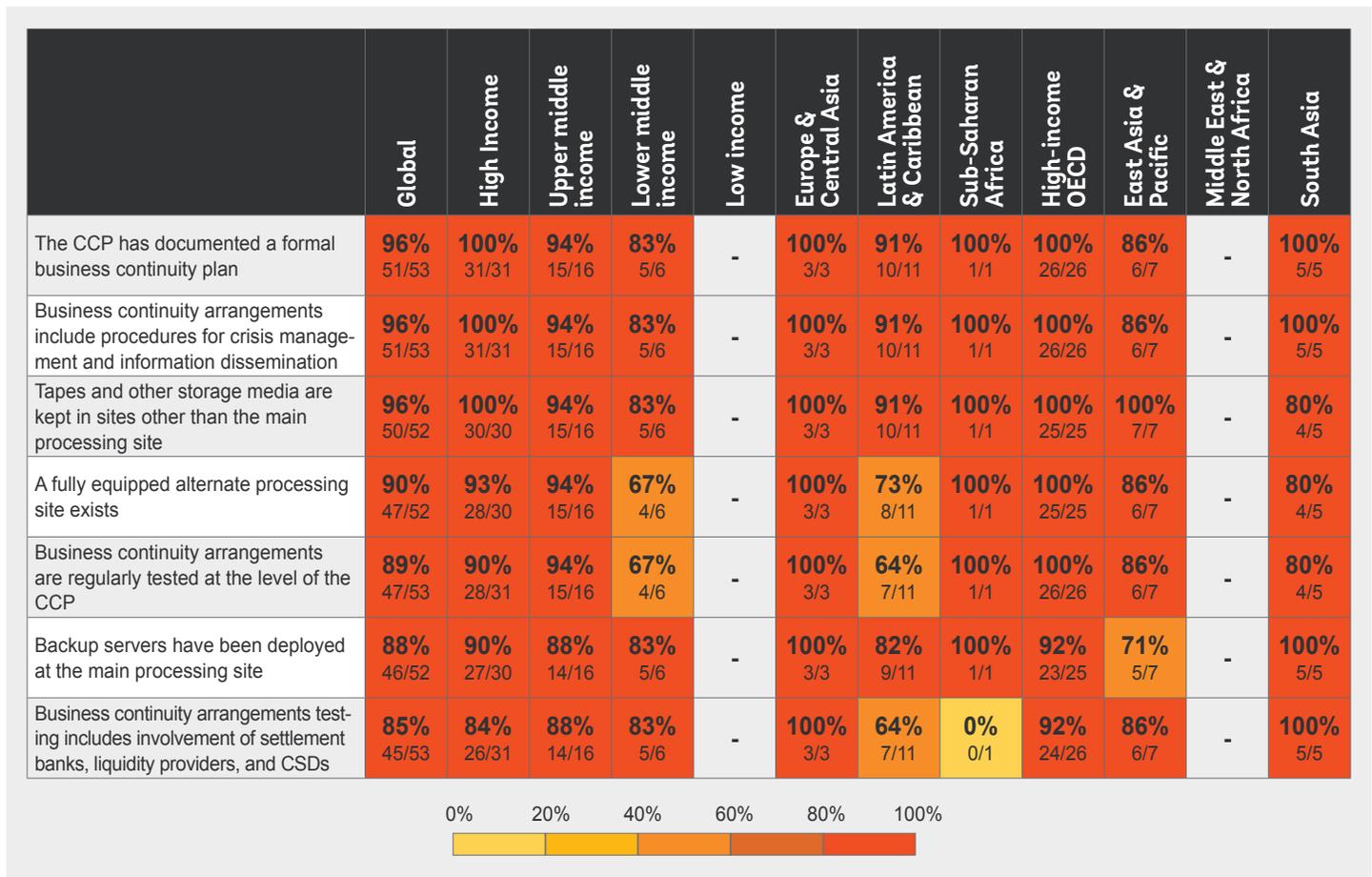
Another facet of CCP risk management involves safe custody of the CCP’s own assets and collaterals pledged by participants, and whether settlement occurs in commercial bank money or central bank money. In the case of securities, globally, 51 CCPs (representing 84 percent of the sample size) hold their own securities and those pledged as collateral by their participants at a supervised and regulated CSD. This is

observed across all regions with slight variations, ranging from 90 percent in high-income OECD countries (28 of 31 CCPs) to 73 percent of CCPs in LAC (8 of 11 CCPs). Regarding cash, 72 percent of CCPs hold their own funds and those pledged as collateral by their participants with commercial banks, and only 28 percent do so with the central bank. Regarding settlement of final positions, 64 percent of CCPs settle their cash positions in central bank money, a percentage that rises to 78 percent in high-income economies and only 33 percent in lower-middle-income economies, mainly those in the East Asia and Pacific (EAP), Europe and Central Asia (ECA), and SA regions.

Forty-five of the 61 reporting CCPs do not have any link with other CCPs. The phenomenon of links between CCPs is predominantly observed in CCPs in high-income OECD economies, as out of the 16 CCPs that do have links with other CCPs globally, 15 are located in those countries. Further, only 3 CCPs reported having links with other domestic CCPs, and all of them are in high-income OECD economies. All but one of the CCPs that have links with foreign CCPs are also located in high-income OECD economies.

CCP operators and regulators across all country income categories and regions demonstrate a very high commitment in implementing robust business continuity and operational resilience measures (figure A1.2). Almost all CCPs (96 percent) already have formally documented their business continuity arrangements, including procedures for crisis management and information dissemination. Further, business continuity arrangements are regularly tested by almost 90 percent of CCPs, the main exceptions being 4 CCPs in the LAC region and one each in the EAP and SA regions. Testing involves settlement banks, liquidity providers, CSDs and in almost all cases CCPs (that is, in 45 out of 47 CCPs that perform these tests regularly). A fully equipped processing site exists in 90 percent of CCPs, and tapes and other storage media are kept in sites other than the main processing site in 96 percent of the CCPs.

FIGURE A.2. - Business continuity arrangements for CCPs



Each box shows the percentage of answers for the FMIs among the jurisdictions in a group. A jurisdiction may have reported multiple FMIs. The number of responding jurisdictions and reported FMIs may differ across options. A jurisdiction may have chosen multiple options for each reported FMI.

Source: World Bank Global Payment Systems Survey.

Note: CCP = central counterparty; CSDs = central securities depositories; FMIs = financial market infrastructures; OECD = Organisation for Economic Co-operation and Development.

Finally, it should be noted that for CCPs, the central bank is the primary overseer in slightly less than half of the economies (48 percent), and another financial sector authority is the primary regulator and supervisor for almost two-thirds of CCPs globally.



Appendix B. Practical guide for conducting a CCP cost-benefit analysis

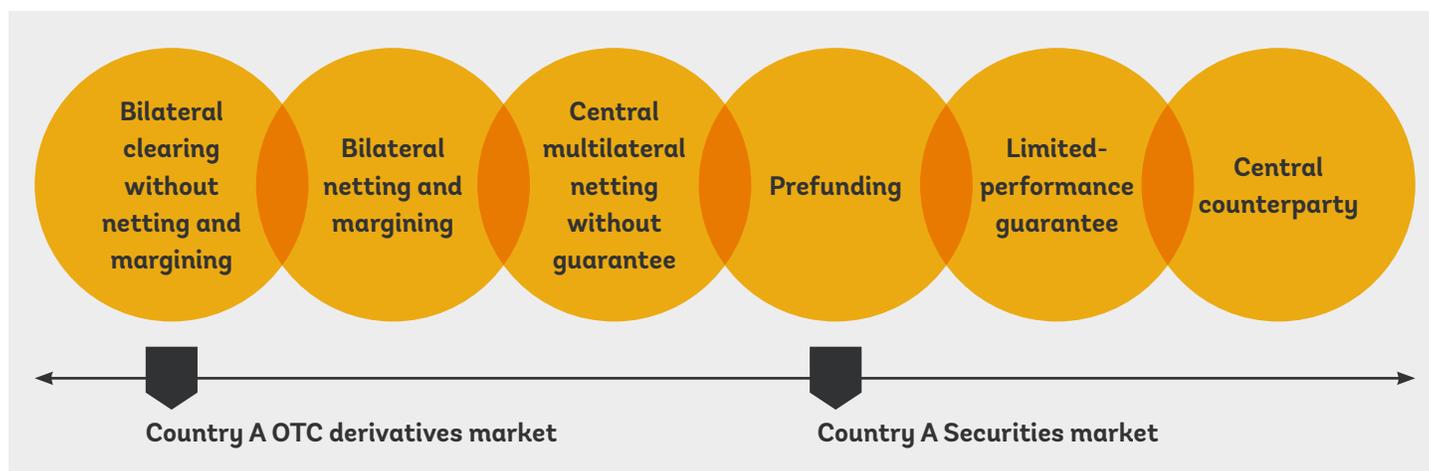
The following questions are intended to be a useful tool to conduct a CCP cost-benefit analysis in practice.

Current clearing model(S)

Identify the current clearing model(s)	<p>1.1. What is, for every financial market (for example, derivatives and securities markets), the current clearing model, using the categorization of figure 2.1 in section 2?</p> <p>1.2. What are the benefits and drawbacks of these clearing models?</p>
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FIGURE B.1. - Example of identifying current clearing models for markets in Country A



Source: Original figure for this publication.

Availability of preconditions for a CCP

Sound legal and regulatory framework	<p>2.1. Does the legal framework recognize the activity of clearing and does it require a CCP operator to obtain a license or other type of authorization?</p> <p>2.2. Does the legal framework provide a high degree of legal certainty for each material aspect of the CCP's activities (in particular novation, open offer, netting, settlement finality, rights and interests in financial instruments, collateral, segregation, and default procedures)?</p> <p>2.3. Does the legal framework support enforceability of rights and obligations resulting from cleared contracts, or more generally, the enforceability of (potential) CCP's rules?</p> <p>2.4. Are other regulations aligned with regulations for CCPs—for example, (1) bankruptcy law, (2) market and investors' regulations, (3) bank regulatory capital, (4) banking recovery and resolution, and (5) accounting and tax?</p>
Effective supervision	<p>2.5 Does the legal framework provide the central bank and/or market regulator with powers to oversee and/or supervise the CCP?</p> <p>2.6 Do authorities have sufficient resources, including sufficient qualified staff members?</p> <p>2.7 Do authorities have sufficient powers to induce change where needed?</p> <p>2.8 Are regulations sufficiently transparent and do they ensure a level playing field?</p> <p>2.9 Do regulations reflect the PFMI requirements?</p> <p>2.10 Do authorities, where needed, cooperate and coordinate and is this reflected in a memorandum of understanding?</p> <p>2.11 Did authorities conduct a self-assessment against the five responsibilities of the PFMI?</p>
Coordination and cooperation	<p>2.12 Is an overall post-trade strategy in place to further develop the financial markets with a road map outlining next steps?</p> <p>2.13 Do all relevant authorities and market participants take part in the development of the post-trade strategy and execution of the road map?</p> <p>2.14 Does the governance structure support the consideration of the interests and input of all relevant stakeholders?</p>
Pricing	<p>2.15 Are timely prices available to calculate margin requirements? Does trading take place on a continuous basis or does it work with opening/closing rotations? Are market makers active? Is the market characterized by frequent trading activity? Are historical prices available?</p> <p>2.16 Are reliable prices available to calculate margin requirements? Are the prices executable? Are these actual or theoretical prices? Are price sources reliable?</p> <p>2.17 Are market regulations in place that govern price setting? Are market regulations in place requiring pre-trade and post-trade transparency of prices?</p>
Market sophistication	<p>2.18 Do market participants (trading members, clearing members) have sufficient CCP and risk management expertise to manage counterparty credit risk exposures?</p> <p>2.19 Do governance arrangements exist in the (potential) CCP to manage all relevant types of risks (for example, a risk committee or risk working groups to oversee the development of the CCP risk management framework)?</p>
Product suitability	<p>2.20 Are instruments, that are potentially subject to CCP clearing, standardized to allow for multilateral netting?</p> <p>2.21 Do the characteristics of instruments allow for appropriate risk management?</p>

Market CBA

EFFICIENCY	
Market efficiency	<p>3.1 Would a CCP, compared with an alternative clearing model, allow for more efficient trading on the (regulated) market by allowing anonymous trading?</p> <p>3.2 Would a CCP (or alternative model) attract additional market participants (for example, foreign investors), which may positively contribute to market efficiency?</p> <p>3.3 Would a CCP (or alternative model) result in additional cost for market participants?</p>
Operational efficiency	<p>3.4 Would a CCP (or alternative model) result in relevant netting benefits?</p> <p>3.5 Would a CCP, compared with an alternative clearing model, allow for other operational benefits (for example straight-through processing) compared to the current clearing model?</p> <p>3.6 Would a CCP, compared with an alternative clearing model, result in additional operational costs (for example, investments in a new platform and new connections and ongoing operational cost), compared with the current clearing model?</p>
Capital efficiency	<p>3.1 Would a CCP, compared with an alternative clearing model, result in lower capital requirements for intermediaries than the current clearing model?</p> <p>3.2 Would a CCP qualify as a QCCP (Qualifying CCP) under Basel regulations? Would this result in reduced capital requirements?</p> <p>3.3 Would a CCP, compared with an alternative clearing model, result in an increase or decrease of funding needs for clearing members compared with the current clearing model?</p>
SAFETY	
Credit risk	<p>3.10 Would a CCP, compared with an alternative clearing model, reduce the net credit exposure of market participants under normal and stress market conditions compared with the current clearing model (considering the application of netting)?</p> <p>3.11 Would a CCP, compared with an alternative clearing model, change the risk distribution amongst market participants compared with the current model?</p> <p>3.12 Would a CCP, compared with an alternative clearing model, reduce the credit profile of counterparties for trading participants?</p>
Liquidity risk	<p>3.13 Would a CCP, compared with an alternative clearing model, change funding liquidity pressures (under stress situations) for market participants compared with the current clearing model?</p> <p>3.14 Would a CCP, compared with an alternative clearing model, change funding liquidity pressures (under stress situations) for the infrastructure operator compared with the current clearing model?</p>
Legal risk	<p>3.15 Would a CCP, compared with an alternative clearing model, change the legal risk faced by market participants and operators (resulting from legal deficiencies) compared with the current clearing model?</p>
Systemic risk	<p>3.16 Would the risk of a single point of failure increase by introducing a CCP, compared with an alternative clearing model, compared with the current clearing model?</p> <p>3.17 Would a CCP, compared with an alternative clearing model, change the concentration of risks within only a few participants?</p> <p>3.18 Would a CCP, compared with an alternative clearing model, reduce or increase contagion risks, following the default of a market participant?</p>
Operational risk	<p>3.19 Would a CCP, compared with an alternative clearing model, change operational risks (cyberattack, fraud, operational outage) in the market?</p>
FAIRNESS	
Market	<p>3.20 Would a CCP, compared with an alternative clearing model, treat market participants fairly and distinguish only on the basis of the risks they bring to the system?</p> <p>3.21 Would a CCP, compared with an alternative clearing model, provide incentives¹⁶ to market participants to pursue safe operations, protect customer assets, adequately manage their risks, and more generally reduce negative externalities related to clearing?</p>

16 Incentives for peer risk management are mutualized loss-sharing or member exposures through appropriate margining.

Business CBA

Revenues	4.1	Would the CCP collect revenues from the guarantee process (for example, per cleared transaction)?
	4.2	Would the CCP collect revenues from collateral and investment services (for example, spread between remuneration returned to member and obtained by CCP in the market)?
	4.3	What additional trading revenues can be collected due to establishment of a CCP (if exchange is investor in CCP)?
	4.4	Are there potential synergies from operating a CCP for multiple markets under the same legal and operational structure?
	4.5	Are there any other quantitative and qualitative (public) benefits resulting from a CCP (in case of a public investor)?
Costs	4.6	What are the IT costs for operating the clearing systems?
	4.7	What are staff costs (for example, management, operational staff, risk experts, lawyers)?
Discount rate	4.8	What is an appropriate discount rate given the type of investors and the specific country risks?
Evaluation	4.1	What is the result of calculating the net present value of future income?
	4.2	How does this result relate to quantitative and qualitative (public) benefits?
	4.3	In conducting a sensitivity analysis, what are the potential downsides (business risk) in case some of the assumptions in the business case change?
Investment	4.12	What kind of parties have an interest in the CCP? What is their interest?
	4.13	Which of these parties are interested in investing in the CCP? What kind of structure can be created so that there is sufficient investment and all interests in the CCP are adequately addressed?

PFMI Compliance

PFMI assessment	5.1	Has the design of a potential CCP been subject to a PFMI assessment?
	5.2	What gaps and issues of concern have been identified, what is the risk assessment, and in what time frame can these be addressed?
	5.3	Has an assessment report been prepared with (1) a clear identification of the issues of concern that need to be addressed, if any, and (2) an indication of an appropriate time frame for addressing each identified issue of concern?
	5.4	Are relevant stakeholders committed to pursuing compliance of the (potential) CCP with the PFMI before implementation of the CCP?

