



Determining the Effects of a Liquidity Sink in the Namibia Interbank Settlement System (NISS)



Bank of Namibia

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- **The 2008 financial crisis** placed huge emphasis on **central banks to understand liquidity behaviours of banks** and **how they would react to various stress scenarios and shocks** as part of **macroprudential analysis**.
- **From a domestic payment standpoint**, it becomes imperative to **determine how participants within the real time gross settlement system (RTGS)** will react to **liquidity risk exposures**, because disruptions in their liquidity sources **could threaten the stability of the National Payment System and entire economy**.
- In addition, **the Namibia Interbank Settlement System (NISS)** as a **designated Financial Market Infrastructure (FMI)** must **perform stress tests as required by the Principles for Financial Market Infrastructures (PFMI)** to ensure that the NISS remains **efficient, resilient and effective under severe plausible stress conditions** as part of **risk management**.
- In this regard, the Bank of Namibia (the Bank) undertook a study to assess **the impact of a liquidity sink stress condition** to NISS participants **using the Bank of Finland Payment and Settlement System Simulator (BoF- PSS3 Simulator)**.
- A **“Liquidity Sink”** stress condition was introduced using historical NISS data for the month of August 2021.

Overview of the NISS

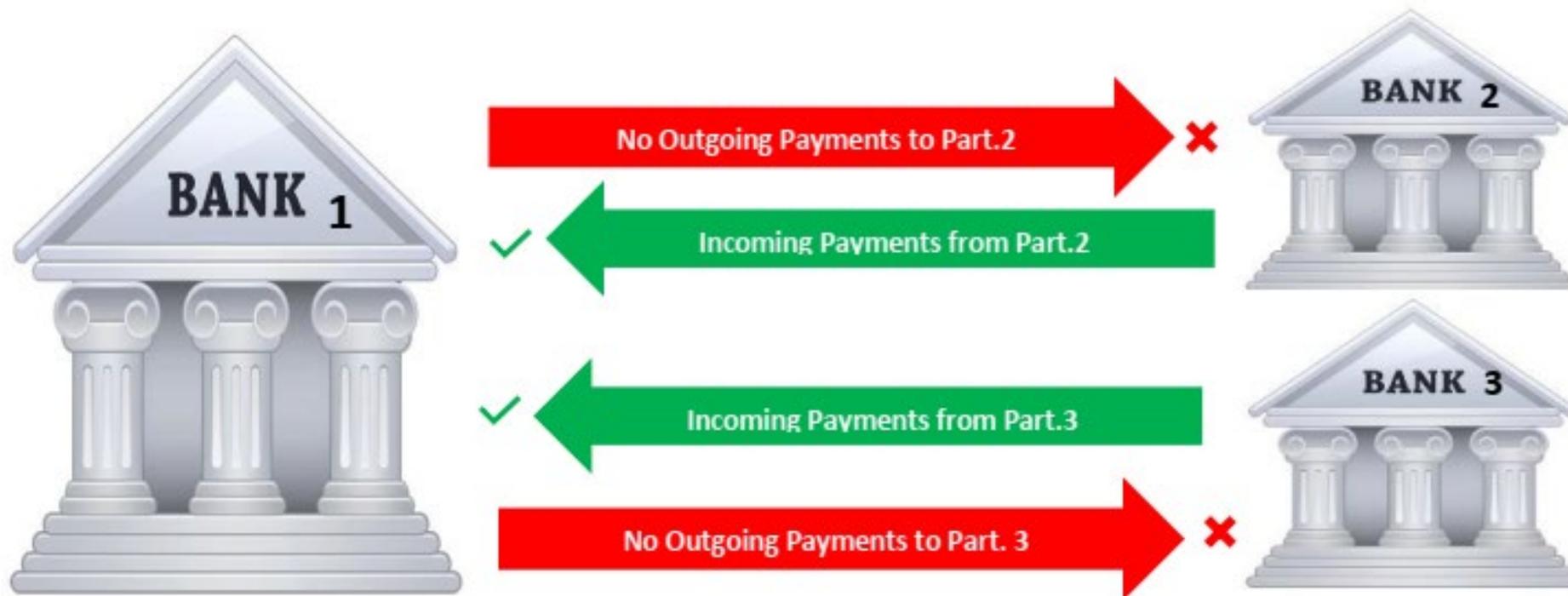
- **NISS** is an RTGS system **owned and operated** by the **Bank of Namibia**.
- The NISS **operates daily** except on Sundays and public holidays.
- Facilitates domestic settlement of **single high-value transactions** and **batched low value interbank transactions**.
- The NISS has 9 participants namely 8 authorised commercial banks and the central bank.
- There are **3 liquidity facilities** available to participants that is the **settlement account, the Bank's intraday and overnight credit facilities**.
- The NISS is connected to **1 automated clearing house**, which operates the **interbank card switch** and **interbank electronic funds transfer system** as well as **clears** such transactions for settlement in the NISS.
- Settlement of single transactions in the NISS takes place in **real time on a gross basis**, while **batch settlement is on a gross level but deferred basis**.
- **In case that a NISS participants has insufficient funds** but has obligations to be paid within the batch, **the entire batch will fail and discard, thereby also affecting the transactions of all participants within the same batch**.



- NISS input data comprised of **participant data, transaction volumes and values, daily settlement account balances and daily collateral balances**.
- The data covered **25 business day** which excluded Sundays and public holidays.
- The liquidity sink scenario stress simulation was performed **using the BoF-PSS3 Simulator**.
- The liquidity sink scenario **limits participants from making both gross and bulk payments to other participants** in the NISS.
- Hypothetically, the liquidity sink scenario may result due to plausible challenges such as **operational disruptions, bankruptcy, the liquidation of a participant, network problems, or fire eruptions leading to emergency evacuations at the participant's premises**, among others.
- The output data includes the **liquidity bounds indicators, direct and systemic effects** as well as the **liquidity deterioration indicators**.
- The liquidity sink scenario is applied to each participant; however, the **results of the central bank are not considered**.

Liquidity Sink Scenario

Figure 1: Liquidity sink diagram



Failing Participant 1 liquidity sink rules:

- 1. Unable to make payments
- 2. Cannot use settlement account balance
- 3. Cannot use credit limits

Assumptions



- It is assumed that the NISS participants are only **limited to their settlement account balance and credit limits** to fulfil payment obligations.
- NISS participants **do not have access to the minimum reserve requirement facility.**
- **Each day is treated as a separate event date** when applying the liquidity sink scenario.
- **Each participant is subjected to the liquidity sink separately.**



Figure 4: Available liquidity vis-à-vis the required liquidity in the benchmark

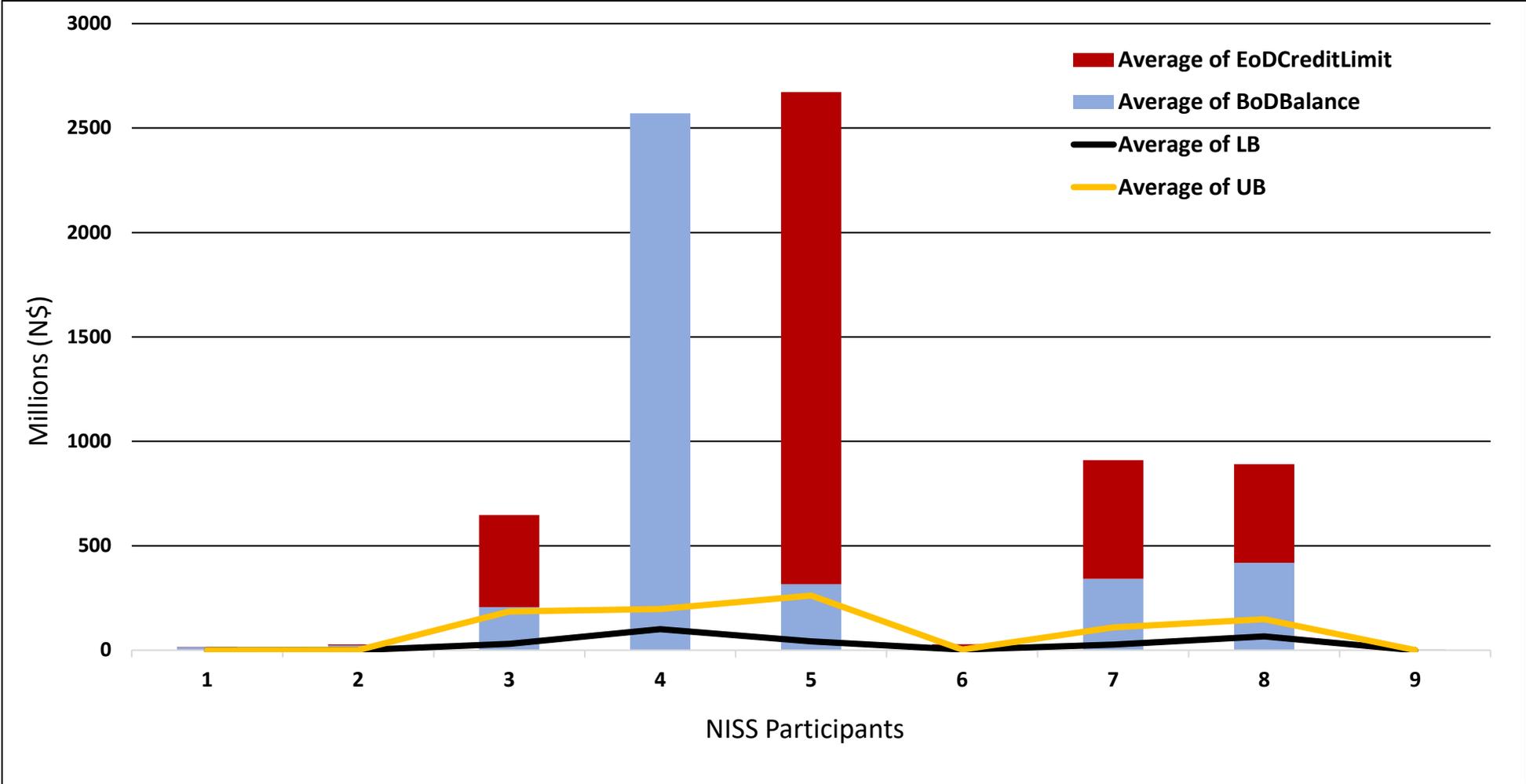




Figure 5: Criticality of the NISS participants

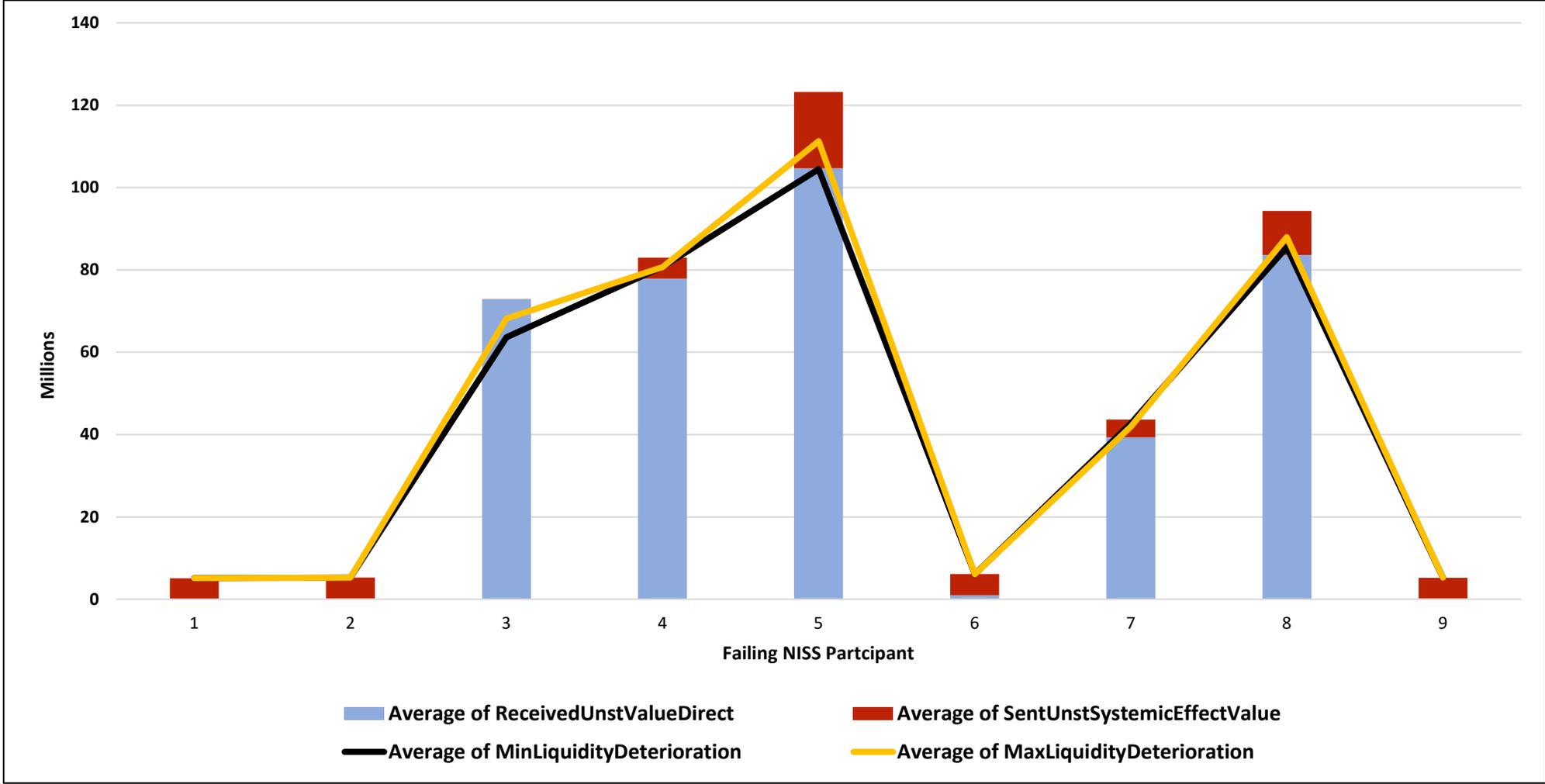




Table 1 Sent Unsettled Systemic Effect Value Averages

	1	2	3	4	5	6	7	8	9	Grand Total
1		43,828	12,191,468	448,702	15,147,484	21,362	6,093,020	6,478,770	352,604	5,097,155
2	102		12,191,468	448,702	15,147,484	21,362	6,093,020	6,478,770	352,604	5,091,689
3	0	0		0	249,291	0	54,398	0	352,604	82,037
4	102	43,828	12,191,468		15,147,484	21,362	6,093,020	6,478,770	352,604	5,041,080
5	32,405	249,266	52,872,200	31,970,426		2,766,091	18,745,621	41,001,193	747,795	18,548,125
6	102	43,828	12,191,468	448,702	15,147,484		6,093,020	6,478,770	352,604	5,094,497
7	102	43,828	12,191,468	448,702	15,147,484	21,362		6,478,770	352,604	4,335,540
8	102	62,550	22,408,910	22,925,954	28,624,724	34,899	10,815,283		747,103	10,702,441
9	102	43,828	12,074,361	448,702	14,898,193	21,362	6,038,622	6,478,770		5,000,493
Grand Total	4,127	66,370	18,539,101	7,142,486	14,938,704	363,475	7,503,250	9,984,227	451,315	6,554,784



Table 2 Maximum Liquidity Deterioration Averages

	1	2	3	4	5	6	7	8	9	Grand Total
1		45,548	12,209,785	468,464.87	15,245,753	21,362	6,094,591	6,495,106	352,604	5,140,010
2	2,702		12,539,746	474,023	15,632,329	21,362	6,297,633	6,782,994	352,921	5,262,964
3	337,673	180,557		102,222,301	263,657,728	55,697	46,989,730	131,409,694	614,122	68,183,438
4	1,737	283,264	84,469,985		267,334,627	38,725	68,343,476	195,350,172	552,556	80,651,260
5	73,491	538,179	265,021,405	264,631,725		7,493,925	80,894,921	270,395,259	1,167,862	111,277,096
6	102	44,149	12,821,301	1,049,697	19,140,281		6,467,483	8,840,419	352,793	6,089,528
7	582	325,411	62,182,583	101,933,327	88,443,693	25,877		82,452,734	418,617	41,972,853
8	1,246	140,443	140,644,909	136,095,393	271,728,676	75,780	154,108,052		789,903	87,948,050
9	102	43,828	12,096,743	511,094	16,192,534	21,362	6,060,504	6,486,636		5,247,649
Grand Total	52,204	200,172	75,248,307	77,462,494	119,671,953	969,261	46,907,049	88,526,627	576,238	45,667,501



Figure 6: Direct Effects

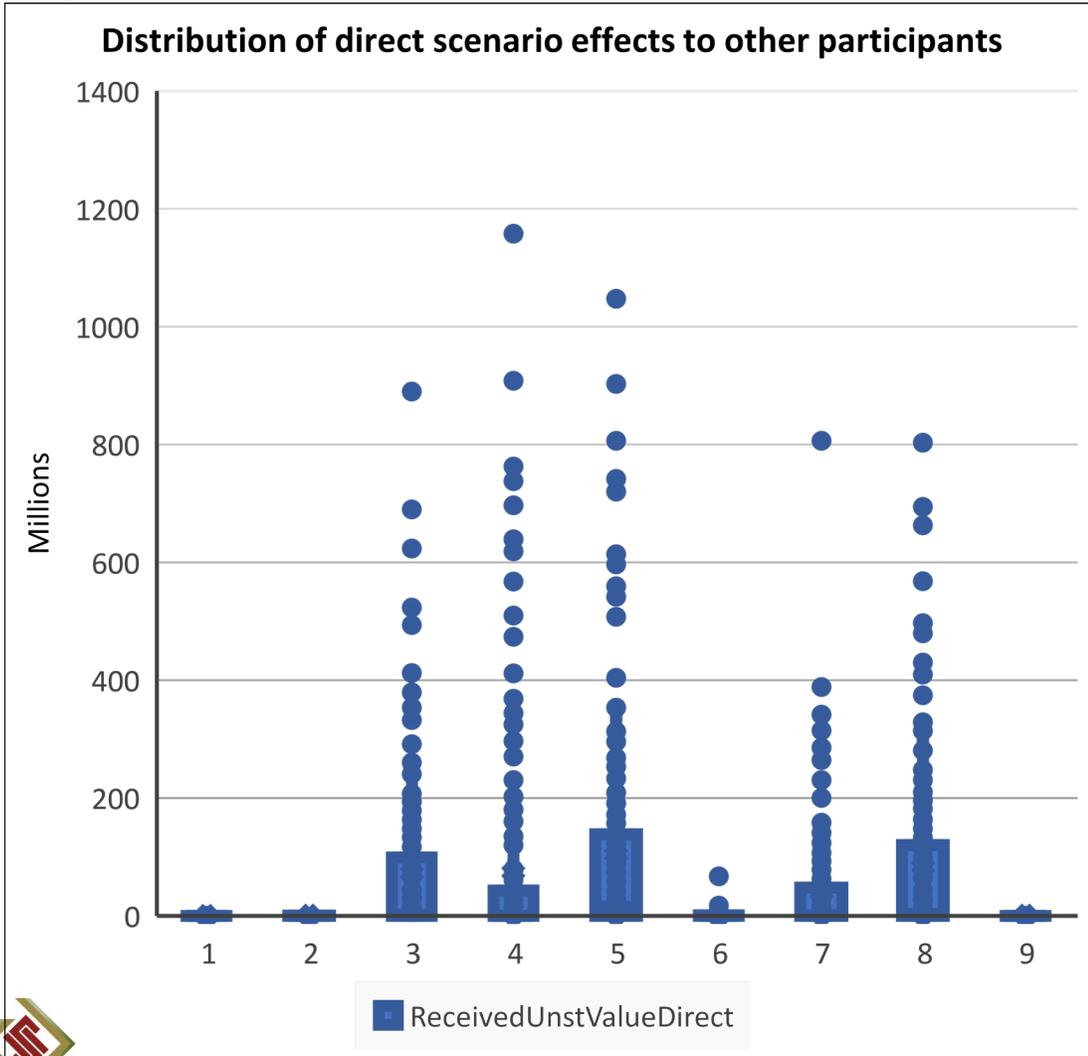
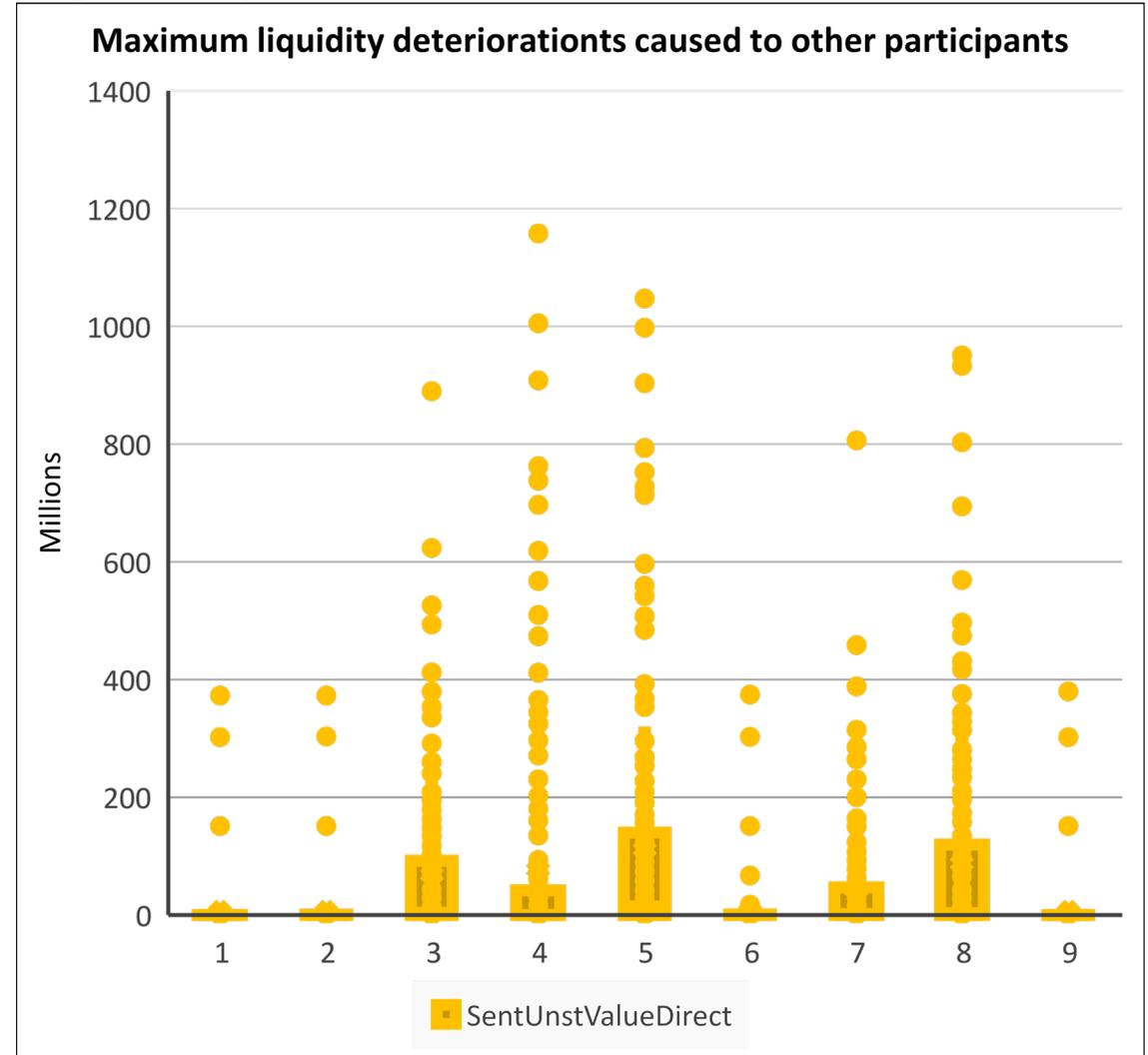


Figure 7: Systemic Effects





- Majority of the **NISS participants maintain sufficient settlement account balances during various liquidity sink scenarios.**
- The **NISS participants are critical towards each other from a batch settlement perspective.**
- The **Settlement System Operator** has **default procedures** and **offers contingency services to** address possible liquidity sink scenarios.

Challenges and Limitations



- **The Simulator assigns the same value of a failed batch transaction** to all the participants in that particular batch which **prohibits the Bank from obtaining the exact liquidity deterioration position** for each participant in the batch.
- The **end of day credit limits data output** from the Simulator **does not mirror the NISS due to the formula** used by the Simulator.
- **Failed transactions on a particular day in the NISS are not included** in the transaction data loaded in the Simulator to execute the benchmark simulation.
- The study is **limited to one month's data**.
- **Limited in-depth simulation and stress test skills** in the Bank.



Recommendations

- The paper recommends the **mandatory pledging of collateral** by all the NISS participants.
- To reduce both adverse direct and systemic effects, the paper recommends that, **in terms of batch settlement**, for **automated clearing house to first determine the settlement obligations in a batch** and **notify each participant** before submission for settlement in the NISS.
- The paper recommends the **strengthening of the NISS Business Continuity Procedures** to **avoid operational and technical failures** that may lead to liquidity sink situations at participant level.
- Considering that the results are based on an analysis conducted for only one month, the paper recommends for **frequent simulations and stress tests to ascertain the identified impact of a liquidity sink scenario in the NISS**.



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THANK YOU