


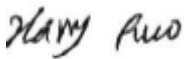


OPERATIONAL DEPOSIT METHODOLOGY DOCUMENT

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SECTION 1. OVERVIEW

1.1 EXECUTIVE SUMMARY

The purpose of this document is to describe the methodology and associated rationale for Bank of China US (“BOCNY”) classification of wholesale deposits as operational versus excess or non-operational. The TRY team has considered various approaches for identifying operational balances and has written this document to support the implementation of the *net debit approach* methodology for wholesale deposits.

Throughout the development of this methodology, the Financial Institutions Department (FID), Corporate Banking Department (CBD), Treasury (TRY) and Market Risk Department (MRD) were engaged to holistically evaluate the bank’s wholesale deposit business. The following sections and appendix items provide a comprehensive description of the methodology’s development, application, and initial results.

As part of this exercise, BOCNY tested a variety of different approaches to determine its operational deposit amount and deemed the net debit approach to best capture the behavior profile of its customer base. In addition, BOCNY engaged external support to benchmark its approach and understands this approach to be widely adopted across the industry.

1.2 OVERVIEW

The Federal Reserve Board (Federal Reserve), the Office of the Comptroller of the Currency (OCC), and the Federal Deposit Insurance Corporation (FDIC) jointly released a final rule to implement in the United States a quantitative liquidity requirement known as the Liquidity Coverage Ratio (LCR). The rule was published in the Federal Register as Regulation WW on October 10, 2014.

The LCR requires in-scope institutions to calculate net cash outflows using prescribed runoff rates and inflow haircuts for relevant categories of the bank’s balance sheet. In order to satisfy LCR guidance, a bank must hold a minimum amount of High Quality Liquid Assets (HQLA) as a percentage of net outflows (e.g. > 100%). For purposes of wholesale deposits, the LCR prescribes run-off rates based on various deposit attributes including presence of FDIC insurance, financial versus non-financial counterparty type, and classification as ‘Operational’ (See *Section 2* for definitions).

Classification of wholesale deposits as Operational requires the development of a methodology to identify deposit accounts and balances eligible for operational treatment. This includes identification of eligible account types and transaction activity based on LCR guidance. Deposits identified as operational are subject to a lower runoff rate given the expectation that these deposits will be less unstable in a period of stress.

As of November 2016, BOCNY is not subject to the U.S. LCR. However, the bank has decided to proactively develop this methodology ahead of mandated compliance for purposes of FR2052a Liquidity Reporting. BOCNY also intends to use this developed methodology to enhance the sophistication of its internal liquidity stress testing framework for purposes of the Enhanced Prudential Standards (Reg YY).

SECTION 2. BOCNY METHODOLOGY

2.1 OVERVIEW OF METHODOLOGY

BOCNY has developed a methodology to identify the operationally-eligible balance of the accounts which qualify for operational treatment. The methodology can be described as the *net debit approach* and relies on historical transaction level detail to identify operational flows within the account. Specifically, the *operational amount* is calculated by summing the amount of each customer's operational payment activity based on the average of monthly debits over a 3-month period. The *operational amount* excludes all internal transfers and only considers transaction types which have been deemed to be for operational purposes.

The *operational amount* is then subtracted from the month-end balance amount to derive the proportion of the account which is deemed to be *Operational* versus *Excess*. The portion of the account considered to be *Operational* would generally be considered to be stickier in periods of stress as this is the amount the customer utilizes to process their operational transactions. *Excess* amount would be relatively flightier as this is money not necessarily used for operational purposes and can be moved to a different institution with greater ease during a period of stress.

As of month-end, total external debits over the prior three months are summed and then divided by three to obtain a monthly average operational amount. Using the past three months of debit activity rather than a shorter time period ensures that quarterly seasonality (e.g. tax payments) is captured. Additionally, BOCNY has performed a sensitivity analysis to the test validity of 3-month time period and concluded this approach to be most appropriate (See *Section 2.5* for additional details)

This methodology will be utilized for FR 2052a liquidity reporting, internal stress testing and the Liquidity Coverage Ratio, when applicable.

Please see below for description of calculation and illustrative example:

- Step 1. Identify wholesale operational accounts
- Step 2. Identify operational debit transactions via transaction codes
- Step 3. Segregate internal vs. external debits via transaction codes
- Step 4. $\left(\frac{\text{Sum of 3-Month debit volume}}{3} \right) = \text{Operational amount}$
- Step 5. EOM Balance- Operational Amount= Excess when positive (if negative, all balances are operational)

Period	Balance	Credits	Debits	Net Change
T-90	100	10	(4)	6
T-89	106	5	(5)	0
T-88	106	6	(10)	(4)
...	102	3	(8)	(5)
T-3	97	9	(12)	(3)
T-2	94	0	(1)	(1)
T-1	93	2	(5)	(3)
90 Days	A 90	35	B (45)	(10)

A	End-of-Month Balance = \$90
B	Total Debits = \$45
C = (B / 3)	Average Monthly Debit Amount = \$15 (\$45/3)
D = C	Operational Amount = \$15
E = (A - D)	Excess Amount = \$75 (\$90-\$15)

2.2 IDENTIFICATION OF OPERATIONAL ACCOUNTS

In order for a wholesale customer to be considered operational, a customer must be utilizing payment/settlement services provided by BOCNY. The cash management/settlement services provided below have been deemed satisfactory to meet the requirements listed in the definition section of the LCR. It has been determined through discussions with the business units that depositors with below account types utilize payment remittance services, FX settlements, and other eligible operational service provisions and are thus eligible for operational treatment. Bank of China is able to systematically identify wholesale customers by the 'TB' fields in the T24 system. Balances from retail and small business customers are excluded from the operational deposit methodology as identified by their TB category.

Products	
DUE TO US BANKS-DEMAND	ESCROW DEPOSIT-NON INT BEARING
DUE TO NON U.S. BANKS-DEMAND	ESCROW DEPOSITS IB COMMERCIAL
DUE TO OTHER FI DDA	BANKERS DEPOSITS-INVESTMET US
DEMAND DEPOSITS-NON PERSONAL	DUE TO BANK INVESTMENT NON US
DEMAND DEPOSIT-CTRL-NON INT BE	DT OTHER FI INV
DEMAND DEPOSIT-INT CHECKING	DUE TO INTERBRANCH - DEMAND
EASY CHECKING - NONPERSONAL	DUE TO INTERBRANCH - INVESTMENT
MONEY MARKETS-NON PERSONAL	DUE TO AFFILIATE DDA US
CORPORATE MONEY MARKET FUNDS	DUE TO AFFILIATE DDA NUS
SAVINGS DEP (STATEMENT) NPL	DUE TO AFFILIATE INV NUS
SAVINGS DEP (STMT) VIP-NPL	

2.3 IDENTIFICATION OF OPERATIONAL TRANSACTIONS

As of August 31, 2016 there were 94 total external debit codes associated with the wholesale deposit accounts. Roughly 40 of these codes reflected debit transactions in which funds were sent to an external third party and constituted operational-related activity. All internal debit transaction codes are excluded from the analysis. External debit transaction amounts are identified by the transactions codes which are listed in *Appendix 1*.

2.3 ACCOUNT AGGREGATION

Bank of China will aggregate wholesale customers by GL category and customer number as determined on the GPS and T24 systems. Customer balances are aggregated to the relationship level using 'Customer Number'. This results in aggregation of individual accounts to the relationship or legal entity level.

Individual accounts are aggregated to the entity level to appropriately capture activity internal to BOCNY. For example, customers often sweep their transaction account balances into investment products in order to earn a higher yield on their balances overnight. If these sweep accounts were considered in isolation, it may cause Bank of China to misstate the operational balance amount.

2.4 MONTHLY CALCULATION PROCESS

The operational amount is calculated at the end of each month using 3 months of transaction history. This amount is then compared to the customer's daily balances on all products that are liquid (i.e., non-maturity products). If total balances are greater than the operational amount, any amount over the operational amount is considered to be excess and receives the non-operational runoff factor. If total balances are less than the operational amount, then all of the balances will be considered operational.

The operational amount is calculated every month end on a one-month lag basis. For example, the operational amount for October month end will be calculated using debits from July, August and September. Data and reporting systems will be continuously enhanced over time to increase timeliness of current reporting capabilities. Additional detail on the process and procedures for calculating operational versus excess, including data controls and governance, can be found in the "Operational Deposit Calculation - Desktop Guide".

2.5 ALTERNATIVE METHODOLOGIES

Peak-Valley Approach - An alternative method for calculating operational versus excess deposits called the 'peak-valley method' was considered but due to the availability of transaction level data, the debit methodology was chosen as a more granular approach. The peak-valley approach is most commonly used when the granularity of the data is not available to allow for transaction level analysis or when subdued volume or frequency of transactions does not produce a representative view of operational activity.

Time Horizon Sensitivity - BOCNY considered varying the 3-month time horizon to include a longer series of transaction data. This was contemplated via the execution of a sensitivity analysis to determine impact to operational balance amounts using 6 and 9 months of transaction data. Results of this analysis indicated no material change to the model output with 3 month assumption often resulting in most conservative results. This has provided increased level of confidence in the appropriateness of the 3-month assumption to capture account behavior.

Exhibit 1. Time horizon sensitivity analysis resulted in no material change in model output

CUST NAME	TYPE	OCT BALANCE	OPERATIONAL PROPORTION		
			3M	6M	9M
PBOC-SAFE HO	FI	1,827,795,163	100%	100%	100%
CHINA DEVELOPMENT BANK	FI	3,494,013,473	100%	100%	100%
CHINA DEVELOPMENT BK-HONG KONG BR.	FI	8,308,799,537	41%	44%	49%
CHINA DEVELOPMENT BANK-S	FI	569,374,785	88%	100%	100%
BEST INVESTMENT CORPORATION	FI	1,118,271,605	100%	100%	100%
CHICAGO MERCANTILE EXCHANGE INC.	FI	3,471,307,619	16%	13%	13%
GIFS CAPITAL COMPANY, LLC	CORP	2,575,509,371	13%	20%	28%
	FI	2,121,331,401	100%	100%	100%
	CORP	4,030,671,810	71%	74%	82%
	ESCROW	143,313,115	1%	1%	2%
	IB	15,761,332,766	100%	100%	100%
	AFF	975,409,156	100%	100%	100%

Removal of Transaction Outliers - BOCNY considered removing large transaction amounts from its historical data series. Analysis was performed to remove the top 1% and top 5% of debit transactions by size. While this did have meaningful impact in output for certain clients, it was deemed this approach would be unnecessarily punitive given it would exclude key debit transactions (e.g. quarterly tax payments) which are by nature large and operational. It was decided outliers in transaction history and unexpected volatility will be addressed via ongoing monitoring performed by FID, CBD, and TRY with further monitoring and review by MRD.

Statistical Modeling & Regression Approach - BOCNY considered conducting a multivariate statistical analysis to produce regression-driven results. After initial consideration, it was determined that this approach would not be feasible with current data granularity/availability. In addition, this approach was deemed overly complex relative to the size and complexity of BOCNY's deposit base.

SECTION 3. DEPOSIT SEGMENTS & KEY ACCOUNTS

3.1. OVERVIEW

BOC has segmented its wholesale deposits into 5 main categories: Non-Bank Financial Institution, Banking Institutions, Corporates, Due to Affiliates, and Due to Interbranch. In addition to these segments, BOC has individually analyzed the behavior of a select group of key customers who represent a large percentage of total wholesale deposits. For the purposes of the ILST, any customer whose balance represents greater than 1% of total liabilities will be identified as a “Key Account” and may be subject to separate treatment from its original peer group segment based on management judgment. Information on this treatment can be found in the wholesale deposit section of the BOCNY EPS Liquidity Stress Test Documentation. The following sections show analysis results for each segment and key customer accounts.

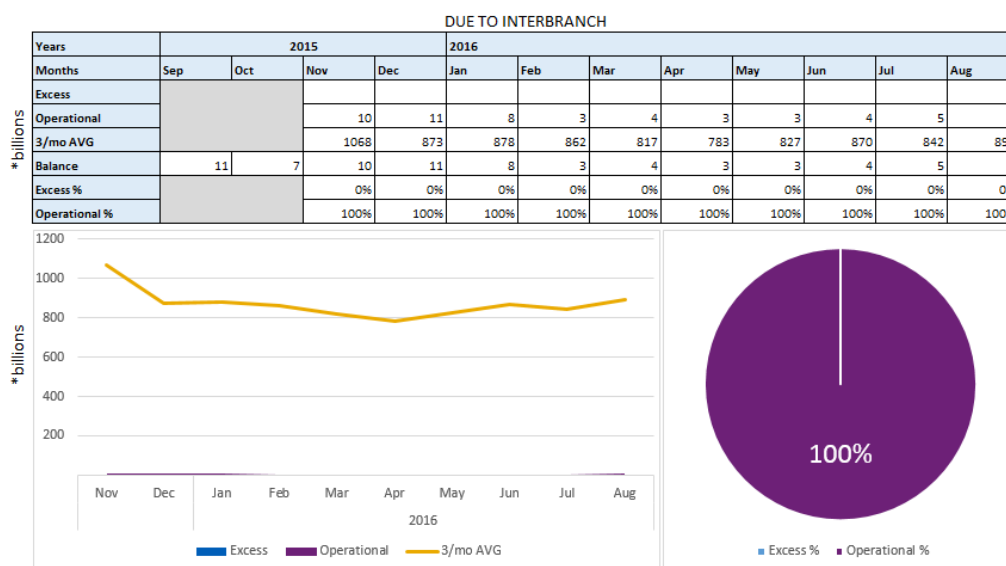
3.2. CUSTOMER SEGMENTS

3.2.1 FINANCIAL INSTITUTIONS

The volume of external operational debits associated with FI customers, either banks or non-bank Financial Institutions, exceeded the end of month balances maintained in the accounts, therefore 100% of the balances were classified “operational”.

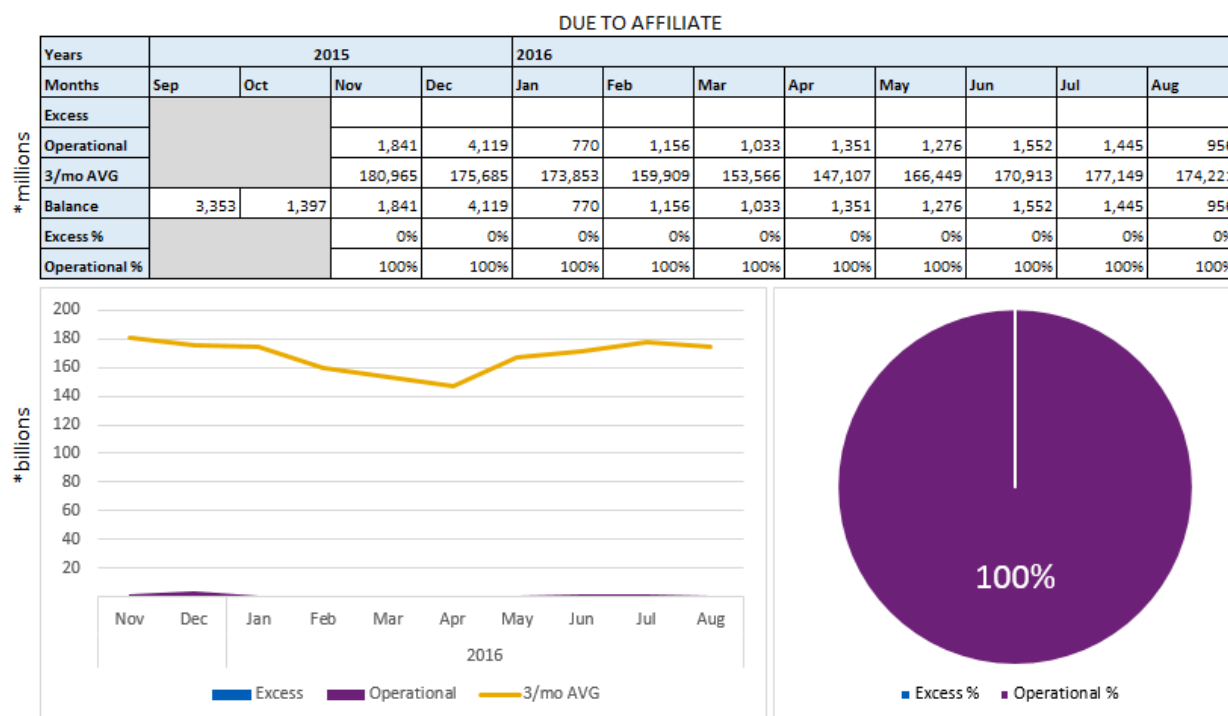
3.2.2 Due To Interbranch

Interbranch customers do not consolidate with BOCNY under U.S. GAAP rules and are thus considered external customers for purposes of the BOCNY operational deposit methodology. There is potential that treatment could differ under the LCR if BOCNY becomes subject to a rule. Because the volume of external operational debits associated with interbranch customers exceeds the end of month balances maintained in the accounts, 100% of the balances were classified “operational”. As of August 31st 2016 balances attributable to interbranch customers were approximately \$6.8 billion versus \$894 billion in average 3 month external operational debits.



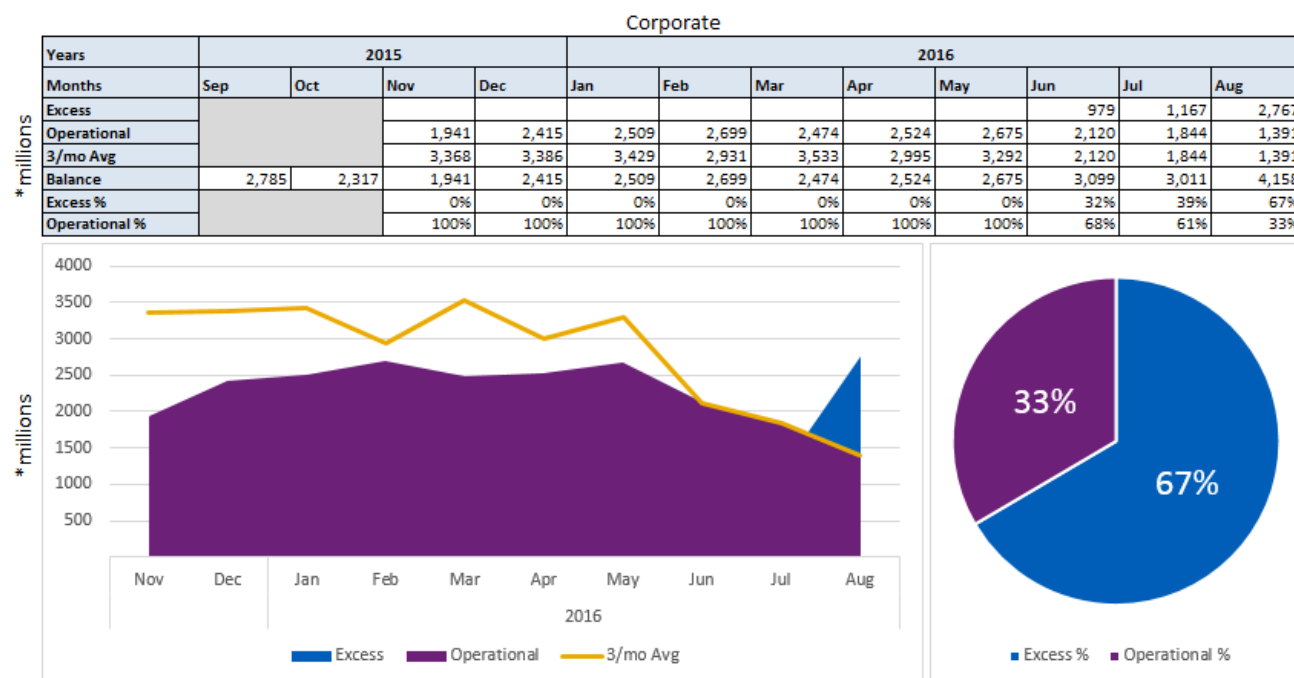
3.2.3 Due To Affiliate

Affiliated companies of BOCNY that do not consolidate with BOCNY under U.S. GAAP are considered external customers for the purpose of internal stress testing and their balances are subject to the BOCNY operational deposit methodology. There is potential that treatment could differ under the LCR if BOCNY becomes subject to a rule. Because the volume of external operational debits associated with affiliated customers exceeds the end of month balances maintained in the accounts, 100% of the balances were classified “operational”. As of August 31st 2016 balances attributable to affiliated customers were approximately \$956 million versus \$174 billion in average 3 month external operational debits.



3.2.4 CORPORATES

3 month average volume of external operational debits did not exceed the end of month balances maintained in the accounts for corporate customers. As a result, only balances below the 3 month average volume of external operational debits were classified “operational”. As of August 31st 2016 33% of corporate customer balances were considered operational while 67% were excess. Balances attributable to corporate customers were approximately \$4.2 billion versus \$1.4 billion in average 3 month external operational debits. Excluded from this segment are escrow balances and customers whose balances represented at least 1.0% of total wholesale deposits held at BOCNY.

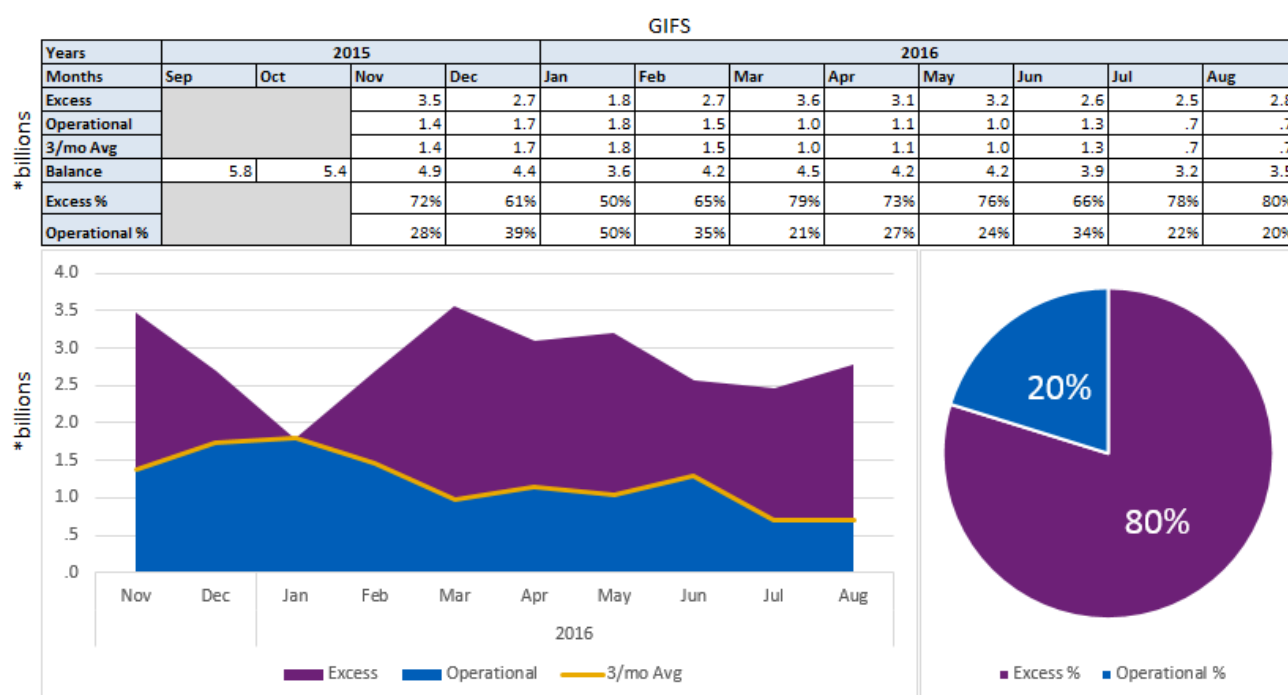


3.2.5 KEY ACCOUNTS

BOCNY recognizes that certain customers could introduce greater liquidity risk because of the size of their wholesale deposit balances as a percentage of total liabilities, the intended purpose of the funds, and the relationship between the customer and BOCNY. For that reason, additional analysis is provided for a selected group of those accounts. Ongoing monitoring of key accounts will be performed by FID, CBD, and TRY with further monitoring and review by MRD.

KEY ACCOUNTS EXAMPLE - GIFS CAPITAL (GIFS)

As of August 31, 2016 GIFS balances held at BOC N.Y. represented 2.4% of total liabilities. Given the balance exceeds the key client deposit threshold of 1% of total liabilities, management has decided to assess GIFS independent of its peer customer group. Results from this individual account analysis indicate 3 month average volume of external operational debits did not exceed the end of month balances held in GIFS accounts. As a result, only balances less than the 3 month average volume of external operational debits were classified “operational”. As of August 31st 2016 20% of GIFS balances were considered operational while 80% were excess balances attributable to GIFS were approximately \$3.5 billion versus \$700 million in average 3 month external operational debits.



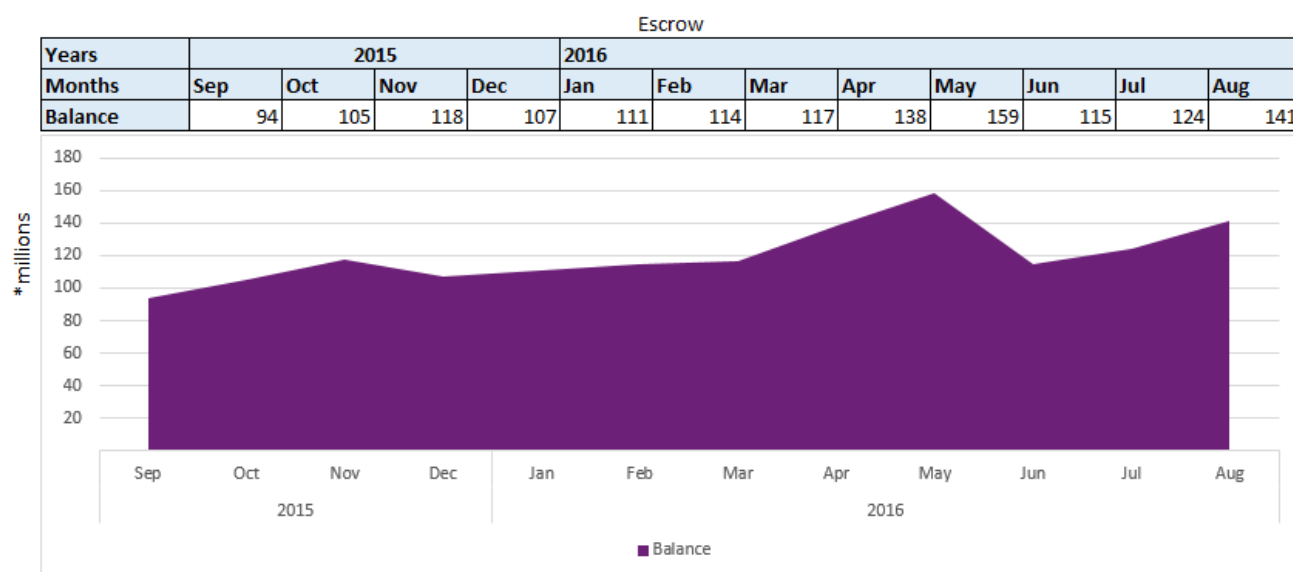
SECTION 4. ADDITIONAL CONSIDERATIONS

4.1 NEW CUSTOMER MODELING

New large customers must be with the bank for a minimum of six months before their balances can be subject to the operational deposit methodology. The rationale for a six month time frame is that the net debit approach is reliant on historical transaction and balance data. Two quarters of customer data allows BOCNY to capture the regular operational activity of its customers and presents a sustentative view of the overall account relationship.

4.2 ESCROW BALANCES

BOCNY has \$70 - \$140 million in escrow accounts utilized for wholesale customer mortgage payments. Given escrow products see very little transactional volume, analysis was conducted to determine if the net debit methodology would be an appropriate approach for calculating operational versus excess balances held. After review of the account behavior and usage, it was determined escrow balances would not be put through the debit model but instead would be considered 100% operational based on their underlying purpose. These balances are held at BOCNY for the sole purpose of receiving escrow services, are not incentivized to remain due to 'rate paid', and are held in special designated accounts. Because of the operational nature of the escrow products, the balances held in those accounts have been deemed fully operational.



SECTION 5. REGULATORY DEFINITIONS

5.1 LCR DEFINITIONS

Operational deposit means unsecured wholesale funding or a collateralized deposit that is necessary for the bank to provide operational services as an independent third-party intermediary, agent, or administrator to the wholesale customer or counterparty providing the unsecured wholesale funding or collateralized deposit. In order to recognize a deposit as an operational deposit for purposes of this part, a bank must comply with the requirements of §1.4(b) with respect to that deposit.

Operational services means the following services, provided they are performed as part of cash management, clearing, or custody services:

- 1) Payment remittance;
- 2) Administration of payments and cash flows related to the safekeeping of investment assets, not including the purchase or sale of assets;
- 3) Payroll administration and control over the disbursement of funds;
- 4) Transmission, reconciliation, and confirmation of payment orders;
- 5) Daylight overdraft;
- 6) Determination of intra-day and final settlement positions;
- 7) Settlement of securities transactions;
- 8) Transfer of capital distributions and recurring contractual payments;
- 9) Customer subscriptions and redemptions;
- 10) Scheduled distribution of customer funds;
- 11) Escrow, funds transfer, stock transfer, and agency services, including payment and settlement services, payment of fees, taxes, and other expenses; and”¹

5.2 SATISFYING THE OPERATIONAL REQUIREMENTS IN THE LCR

A deposit must satisfy the following requirements outlined in §1.3 of the LCR in order to be recognized as an operational deposit.

5.2.1 REQUIREMENT 1

This requirement states that a customer’s services must be linked to an agreement that requires a 30-day notification period to terminate. It is existing practice that many BOCNY deposit account service agreements include provisions that require a customer seeking to terminate services to provide Bank of China with 30 days’ notice. BOCNY is working to alter its service agreements for remaining accounts.

5.2.2 REQUIREMENT 2

This requirement states that the balances must be held in a designated operational account. BOCNY has the ability to identify accounts utilized for operational purposes and thus has designated accounts based on this approach. BOCNY does not deem it necessary to change product naming convention or request the

¹ Federal Reserve System, 12 CFR Part 249 [Regulation WW; Docket No. R-1466]

opening of new separate accounts due to the ability to identify presence of operational services and granularity of the utilized net debit approach.

5.2.3 REQUIREMENT 3

This requirement states that accounts must be used for operational services. BOCNY has identified accounts which utilize services identified as operational (See *Section 3.2* for discussion of acceptable service offerings). In addition, the net debit approach ensures that customers who have payment/settlement services with BOCNY must actively utilize this service in order for the balances to be classified as operational.

5.2.4 REQUIREMENT 4

This requirement states that the account must not be designed to create an economic incentive for the customer. While BOCNY typically pays near market rates for its deposit base, the bank believes usage of the net debit approach further reduces potential negative impact of interest rate sensitive clients for purposes of operational deposits. Presence of a higher interest rate would not be expected to increase the operational portion of the account given the usage of the net debit approach, as the client's external payments are not driven by the rate they receive on transaction accounts. For example, if a depositor were to increase total balances due to rate incentives, the operational amount would not increase absent a corresponding increase in operational activity (i.e. external debits). This would result in an increase in excess amounts which are subject to higher runoff rates.

5.2.5 REQUIREMENT 5

This requirement states that the deposit must be (1) empirically linked to operational services and (2) must not be volatile. (1) Some accounts eligible for operational treatment utilize DDA accounts that are linked to interest bearing DDA accounts (i.e. investment accounts). Many DDA accounts hold very low target or peg balances and anything over the peg is swept overnight to an investment account where deposits earn interest. These balances must be considered in the suite of balances that a customer uses to manage their cash and are passed into the net debit model at the relationship level. (2) Accounts with excess volatility not captured by the net debit model will be excluded from the methodology based on ongoing monitoring of key relationships. This monitoring will be formalized into the procedures of the Financial Institutions Department. On-going monitoring will be conducted by the Financial Institutions Department (FID), Corporate Banking Department (CBD), and the Treasury (TRY) with further monitoring and review by the Market Risk Department (MRD)

5.2.6 REQUIREMENT 6

Deposits held in connection with prime brokerage services cannot qualify for operational treatment. BOCNY does not provide prime brokerage services, therefore this requirement is not applicable.

5.2.7 REQUIREMENT 7

This requirement states that excess balances from correspondent banking clients must not be held in transaction accounts. Excess cash from correspondent banking clients would typically be held in the form of federal funds purchased; BOCNY does not purchase fed funds from their clients.

SECTION 6. SUMMARY

The TRY team has considered various approaches for identifying operational balances and has written this document to support the implementation of the net debit approach methodology for wholesale deposits. BOCNY will continuously analyze, review, and monitor the use of this methodology as a means for identifying operational versus excess wholesale deposits and will make adjustments to the methodology as needed. Effective challenge by MRD throughout the development of the methodology was a critical component of the analysis and will continue to be an integral element on a go-forward basis.

APPENDIX

APPENDIX ITEM 1

External debit transaction amounts are identified by the transactions codes listed below.

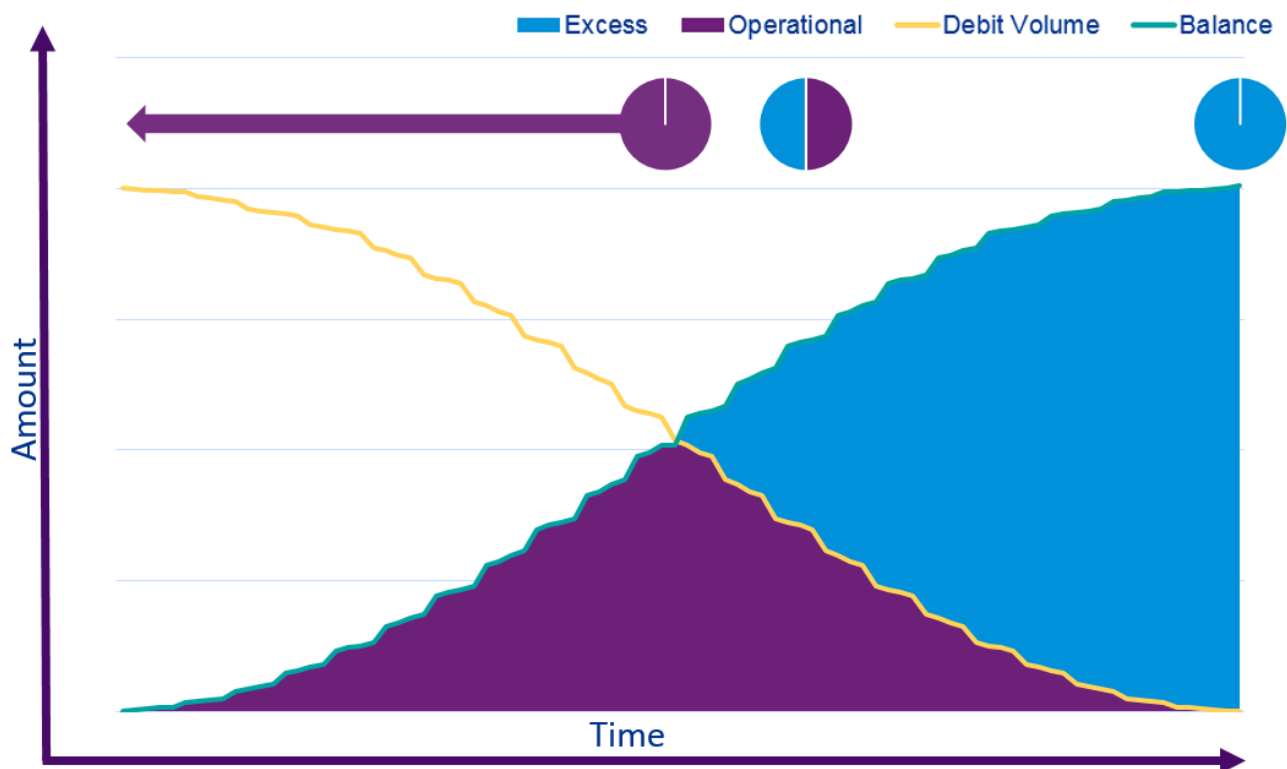
External Debits		
ACH Debit	Payment of Principal	PD Principal Debit
Assignment of Proceed	PD Interest Debit	Principal Decrease
Bank Check Deposit	GPS PD Chips Payment	Principal Increase
Cash Check	Incoming Remittance Swift	Principal Redemption
Cash Deposit - Credit	LC Payment Debit	Principal Repayment
Cash Withdrawal	Miscellaneous Debits	Reimbursement Under LC's
Certified Check	Mortgage Principal Drawdown	Remit Debit Account
Check	New Placement	Remittance TT
Check Deposit	Official Check	Repayment of Principal
Check Withdrawal	Out Remittance Wire Transfer	Escrow Payment
Chips Federal Wire Transfer	Outgoing Remit Mail Transfer	Check Payment
Courier Service	Outgoing Remit Stop Tele Transfer	Remittance Check Debit
Curr NCR	Outgoing Remit Tele Transfer	Real Estate Tax
GPS PC Chips Receive	Outward Check	Incoming Check Processing
		DRRE NCR

As of August 31, 2016

APPENDIX ITEM 2

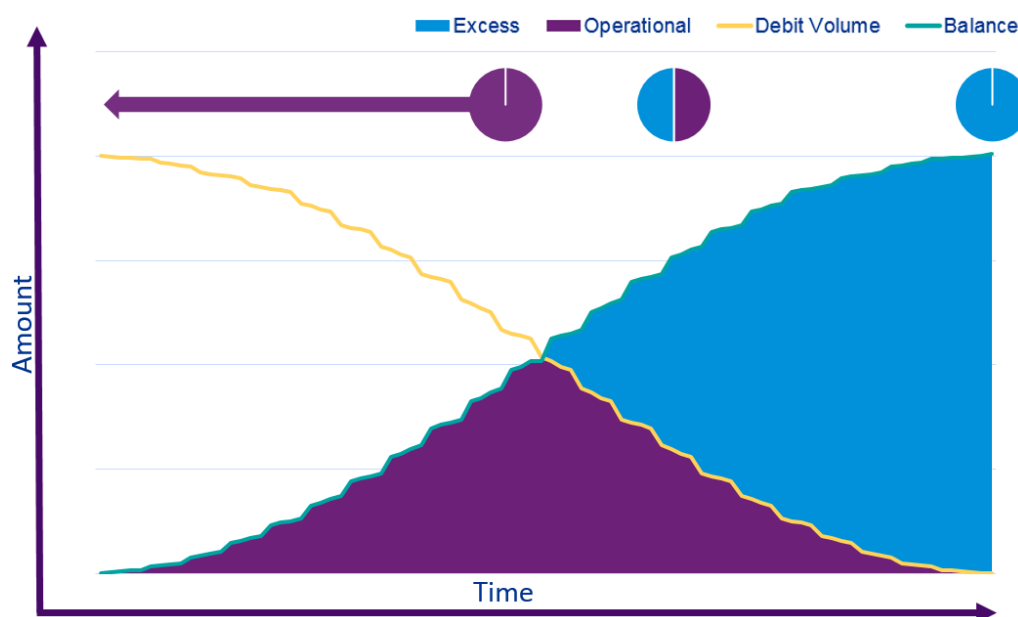
The following graphs are used for illustrative purposes to explain the impact of the net debit approach across different account behaviors.

Exhibit.2 Percentage operational versus excess over time



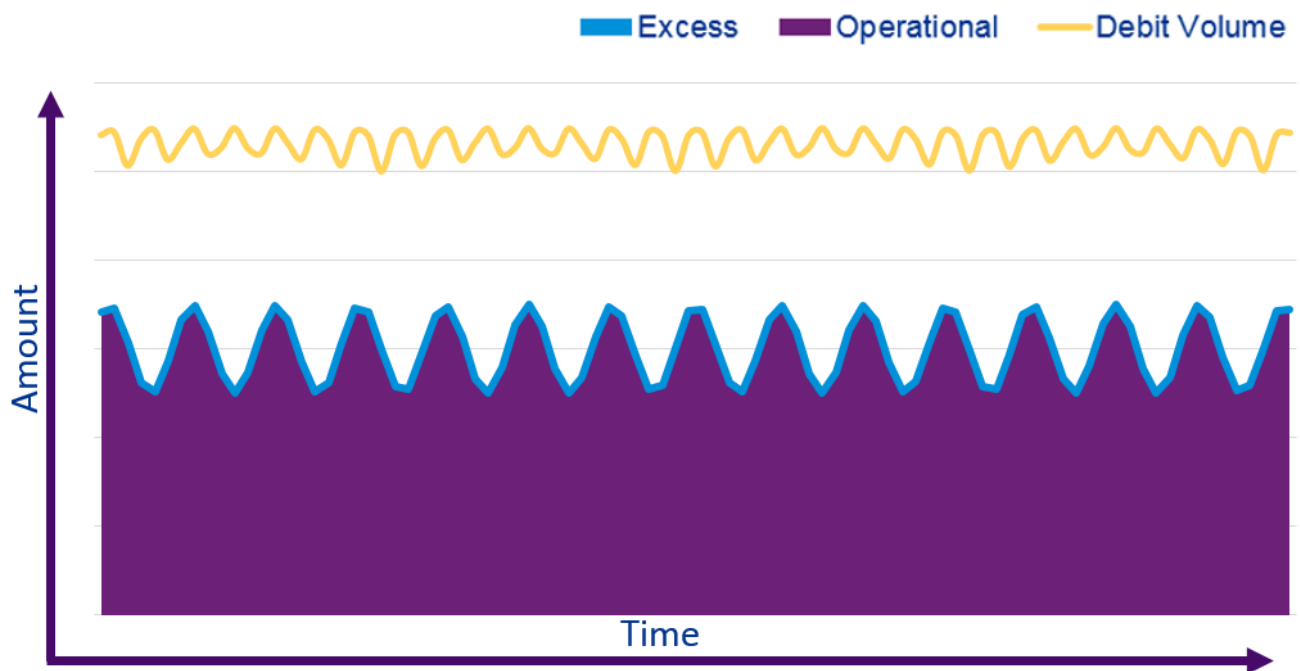
In Exhibit.2, both balances and transaction volume can be seen increasing over time. In this simplified example, the total account balance (represented by the sum of the blue and purple shaded areas) is volatile but exceeds the average external debit volume (represented by the yellow line). Those balances that fall below the line are more stable and thus considered operational, whereas the more volatile balances that lie above the average external debit volume are considered excess. The six pie charts at the top of the graph show the percent of the balances that can be considered operational versus those that are considered excess. Starting from the leftmost pie chart, we can see that the excess amount is approximately $\frac{1}{3}$ of the total balance. Moving to the next pie graph, the account balance growth has exceeded the external debit volume growth. As a result, the excess portion of the balance has grown to just under $\frac{1}{2}$ of the total balance.

Exhibit.3 Percentage operational versus excess over time



In Exhibit.3, external debit transaction volume decreases (yellow line) while wholesale deposit balances increase (green line). 100% of the wholesale deposits are considered operational until the point at which the two lines converge in the middle of the graph. At that point, the excess balances begin to grow (blue area) while the portion that can be considered operational (purple area) shrinks and is capped by the total operational external debit volume.

Exhibit.4 Percentage operational versus excess over time



In Exhibit.4, the average 3-month external operational debit volume (yellow line) well exceeds the end of month balances (blue line). In this example, 100% of the end of month balances are considered operational (purple area).