

Investment Policy

FGC (Brazil)



Foro de Seguro de Depósitos de las Américas
Americas Deposit Insurance Forum

Outline

1. Investment Policy Working group
2. Survey, general principles, and how the minimum immediate liquidity became a theme
3. Methods for determining the minimum immediate liquidity amount
 1. An example of determination of the immediate liquidity by educated guess (Aurelio Suárez, COPAB)
4. Financial Cycle Indicator (FCI) as a leading indicator for predicting banking crisis
5. How the FCI can be used to guide investments in booms and recessions
 1. When the DIA should increase or decrease its share in immediate liquidity
 2. By how much the DIA should increase or decrease its share in immediate liquidity
6. Debate: Questions to be discussed on the tables

Working Group, Survey and General Principles

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Working group

- In the last LARC Meeting (2017 AGM, Quebec) we initiated a Working Group with the aim to discuss DIA Investment Policies
- We opened the EoI and six jurisdictions showed interest in participating
 - Argentina (SEDESA): Alejandro López, Juan Manuel Ramos and Marcelo Mura;
 - Colombia (FOGAGIN): Juan Quintero Valdivieso;
 - Ecuador (COSEDE): Juan Miranda and Daniela Vásconez;
 - Peru (FSD): Carlos Carrion;
 - Uruguay (COPAB): Aurelio Suárez and Nicolás Yarzabal;
 - Brazil (FGC, leading the group): Bruno Lund, Carlos Vianna and André Loes.
- FGC proposed an Agenda of deliverables targeting the LARC Meeting at Mexico City and four conference call meetings.
 - January 16th, February 6th, March 6th and April 10th .
- The meetings were very productive and the group was able to deliver everything consented in the Agenda at the kick-off.
- The presentation we are doing now is the result of discussions made inside this Working Group.

2017 AGM Survey plus talks with LARC Members

- The answers obtained in the survey (Quebec, 2017 AGM) led us to conclude that:
 - Liquidity and security are the primary and most important goals to achieve in a DIA Investment Process
 - The greatest trade-off is security/liquidity versus return.
- Another aspect raised up to us in talks with other Latam DIAs is that:
 - Financial cycle downturns, when probability of default and failures are higher, require more liquidity
 - Financial cycles should be taken into account in an Investment Policy
- We translated those statements into the following considerations:
 1. An Investment Policy should set a nominal minimum amount of immediate liquidity
 2. And, this minimum should vary (up or down) along with the financial cycle.
- Definition of immediate liquidity: is the amount of resources that should be at the disposal of a DIA in a couple days with little or no haircut at all (market, unwinding or credit risk).

General Principles

1. The IP should preserve a minimum level of immediate liquidity in order to respond to a banking crisis
 2. For the resources in excess of the minimum liquidity, the IP should target a strategic allocation aligning the nature and term structure of investments with the other policy objectives of the DIA (returns, diversification, etc...)
 - as well as to specificities of its economy and markets (level of dollarization and inflation, low liquidity or tenor of the local currency debt); and
 3. Both goals described above should be subject to a tactical allocation taking into consideration current macro conditions, and, more importantly, the phase of the financial cycle
- The study presented here will focus on principles 1 and 3:
 - Determination of immediate liquidity.
 - When and by how much a DIA should increase or decrease its immediate liquidity in tandem with the financial cycle
 - Of course the discussions carried out so far anticipate some of the steps necessary to address afterwards the principle (2).

Immediate Liquidity

- a) Ideally, this minimum level could be defined based on a **model** estimating expected and unexpected losses*
- b) But, it can also be defined by an **educated guess** or an expert judgment

How should one set the minimum immediate liquidity amount?

1. It should be greater or equal than the amount the DIA expects to disburse during the first X months of a banking crisis
2. One would expect that after this period there would be windows of opportunity to unwind less liquid investments without significant price pressure

Immediate liquidity vis-à-vis financial cycle

- Depending where the economy stands on financial cycle, the minimum amount quantity should be increased or decreased.
- Ideally, in the beginning of a downturn, the DIA should build up its immediate liquidity slowly reallocating resources from less liquid, but with better return, assets. Conversely, as financial cycle starts an upward trend, the DIA can reallocate part of its immediate liquidity onto better return securities, though less liquid.

*The DIFT models developed by LARC members (Brazil, Colombia, Mexico) could serve as a base for this exercise in other countries of the region.

Immediate Liquidity – by model

How FGC is setting its minimum liquidity amount?

1. FGC runs its Fund Sufficiency Model interchanging the time horizon parameter from 1 year to 3 months.
2. The result delivered determines how much FGC could lose in 3 months.
3. To guarantee the safety of FGC, we established that:
 - Should recalculate at each 6 months and, if necessary, adjust the minimum immediate liquidity slowly reallocating resources from less liquid, but with better return, to liquid assets

FGC - Immediate liquidity as a % of the Fund Size

Horizon	1M	3M	6M	9M	1Y
Liquidity	33,31%	56,29%	75,41%	88,03%	100%

Immediate Liquidity – by Educated Guess

Some methodologies that could be used

- Sum of covered deposits bellow an **Internal rating**
- Sum of covered deposits bellow an **Agency rating**
- Sum of covered deposits bellow a Risk rating calculated from quantitative risk variables (CAMELS) and qualitative risk matrices
- Sum of covered deposits of the top N-th non-SIFIs

Methodology for establishing Risk Based Ratings

Aurelio Suarez COPAB (Uruguay)



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Objectives of the Risk Based Ratings

1. Premiums – contributions
 1. Fixed rates
 2. Risk adjusted rates
2. Risk based rating Methodology
3. Educated guess – Minimum Liquidity

1. Contributions

1. Insured Deposits – last year's monthly average
2. Fixed rates:
 1. Local currency deposits: 10 bp
 2. Local currency deposits : 20 bp
3. Risk adjusted rates :

Risk Rating	Risk adjusted rate (bp)
I	0
II	5
III	10
IV	15
V	20

2. Risk Based Rating Methodology

VARIABLES:

Institutional strength profile:

- Weaknesses (CAMELS)

- Institutional net worth vs. Regulatory net worth

Capability & Commitment of Holding Company:

- Capability – International credit rating

- Commitment – holding company letter of commitment

2. Risk Based Rating Methodology – Risk Matrix

Sub Matrix – Institutional strengths

Weaknesses (in Uruguay we use CERT instead of CAMELS)

CERT analysis

Calidad de gobierno **C**orporativo

Evaluación **E**conómico

Financiero

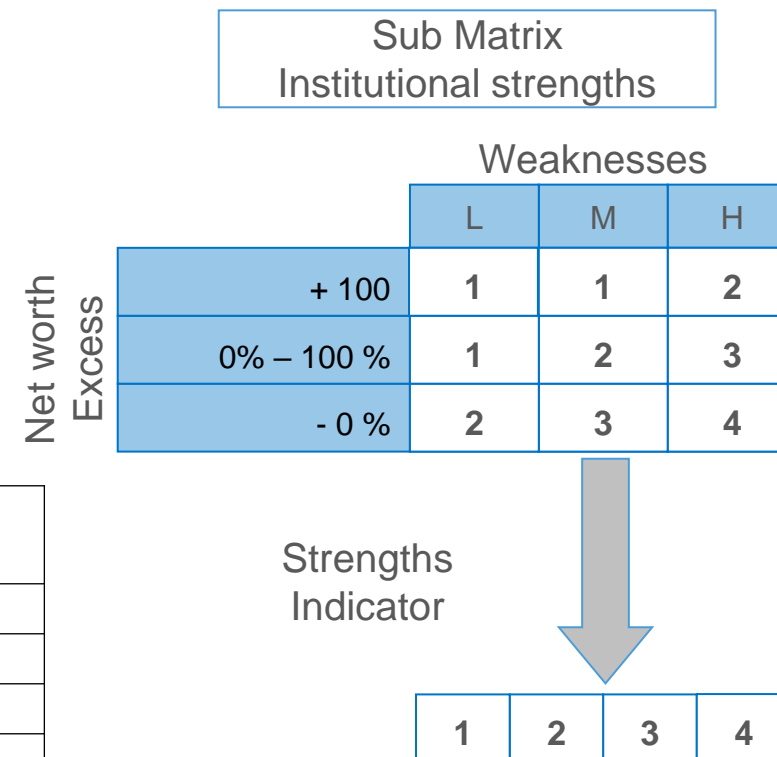
Evaluación de **R**iesgos

Riesgo **T**ecnológico

Institutional net worth vs. Regulatory net worth
Excess

CERT WEIGHT (COPAB)	
C	40%
E	20%
R	30%
T	10%

CERT weighted	Risk
<2.5	LOW
< =2.5 y <3.5	MEDIUM
> = 3.5	HIGH



2. Risk Based Rating Methodology – Risk Matrix

Sub matrix – Capability & Commitment of Holding Company

Holding Company Credit Rating

Investment Grade

Speculative

Holding company letter of commitment to assist domestic subsidiary in times of crisis

Sub matrix – Capability & Commitment of Holding Company

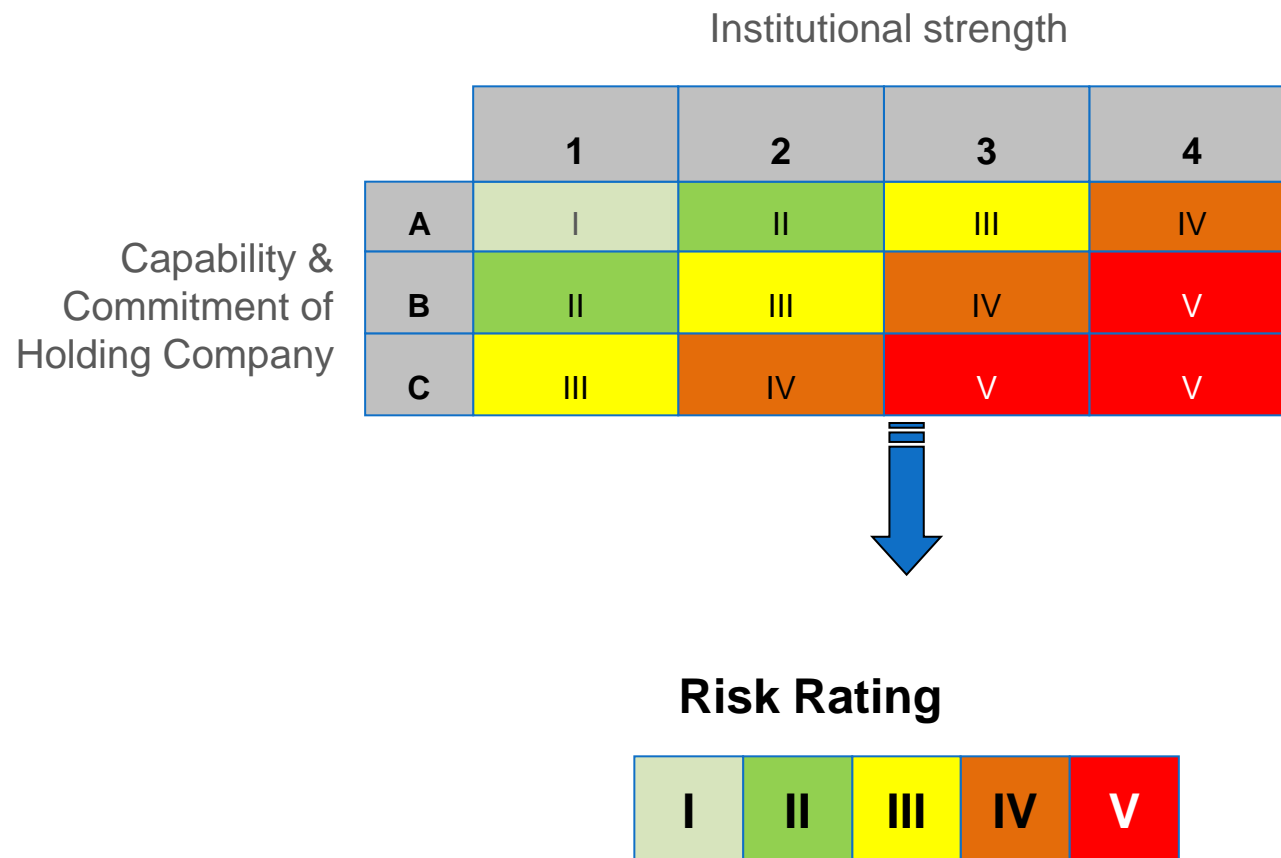
Holding Company Credit Rating

		Holding Company Credit Rating	
		Investment Grade	Speculative
Letter of commitment	Yes	A	B
	No	B	C

Capability & Commitment of Holding Company Indicator

A	B	C
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2. Risk Based Rating Methodology – Risk Matrix



Risk Rating	Risk adjusted rate (bp)
I	0
II	5
III	10
IV	15
V	20

3. Educated guess – Minimum Liquidity

1. Establish each Institutional Rating
2. Establish the insurance exposure (SIDIIF) for institutions rated V y IV
3. Build portfolio:
 1. Short term (30 days) – immediate liquidity (2)
 2. Medium term (up to 180 days)

Financial Cycle Indicator (FCI)

FGC (Brazil)

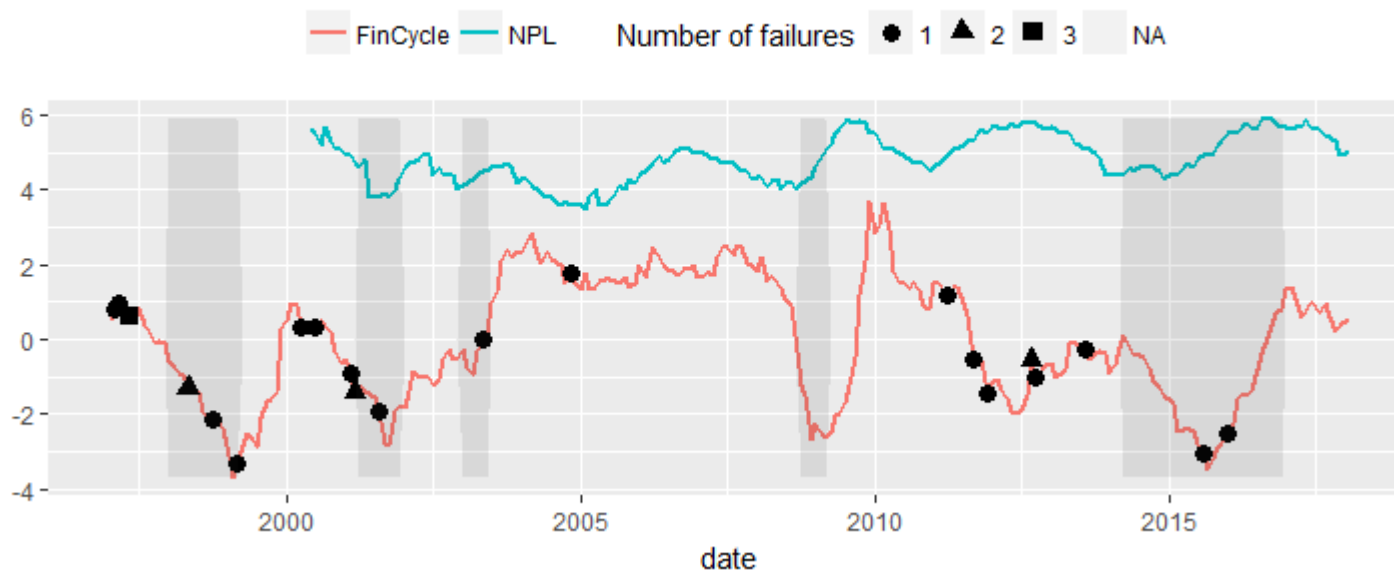


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Financial Cycle

- We surveyed the literature of financial and banking crisis to create a list of potential variables
- We also included in the list, variables we thought were important to Latin America (Commodities, UST, etc)
- Then surveyed the literature of building Leading Indicators and chose a methodology called **Principal Component Analysis**.
 - The methodology reduce several variables into a single composite variable (1st PC) that explains the most part of the data variance.

Financial Cycle, NPL, Default Events and Recessions



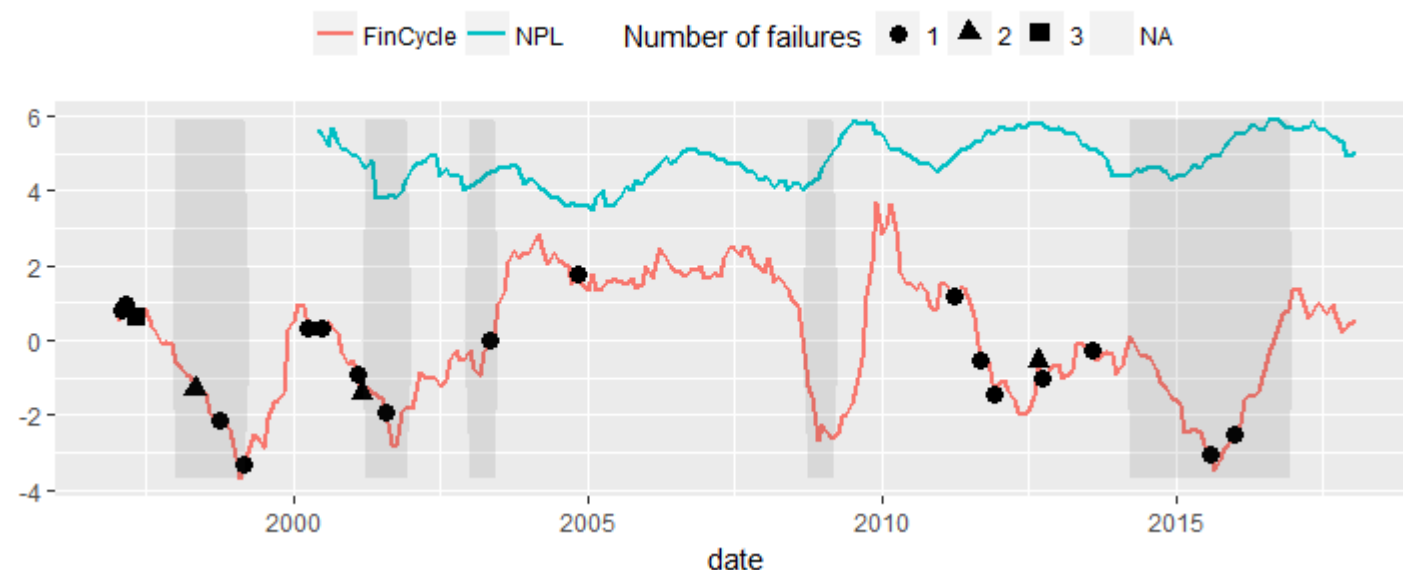
We chose the indicator that presented:

- The best Internal Consistency (elected variables and their signs).
- The most parsimonious specification:
 - 6 variables
- The greater degree of anticipation with respect to NPL..

Financial Cycle, NPL, Default Events and Recessions

Financial Cycle

- Elected Variables:
 - CRB YoY (0,5)
 - Current Account / GDP (0,43)
 - Stock exchange Index - Ibovespa YoY (0,41)
 - Real GDP YoY (0,38)
 - UST 10Y YdY bps (0,21)
 - REER YoY (-0,46)
- 12 other variables tested, but at end were discarded
 - BRL YoY; M2 YoY; M2/GDP YoY; CPI YoY; Ext Debt/GDP; CA/GDP YoY; Us Treasury 10y; Treasury slope; Us Treasury 2y; Us Treasury 2y YoY; IBrX YoY; Credit/GDP YoY
- One of the most surprising variables because of its duality of meaning is the UST 10Y differentials
 - In principle we can think higher rates are not good for developing countries per se
 - But, in the other hand, it signals a healthy US Economy and, by consequence, a healthy World Economy.
 - We also found the 12 month treasury rates differentials are positive correlated with stocks, commodities and Current Account to GDP. Variables pointing to a healthier Brazilian economy.



Relating Immediate Liquidity with the Financial Cycle Indicator

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Financial Cycle and Immediate Liquidity

When

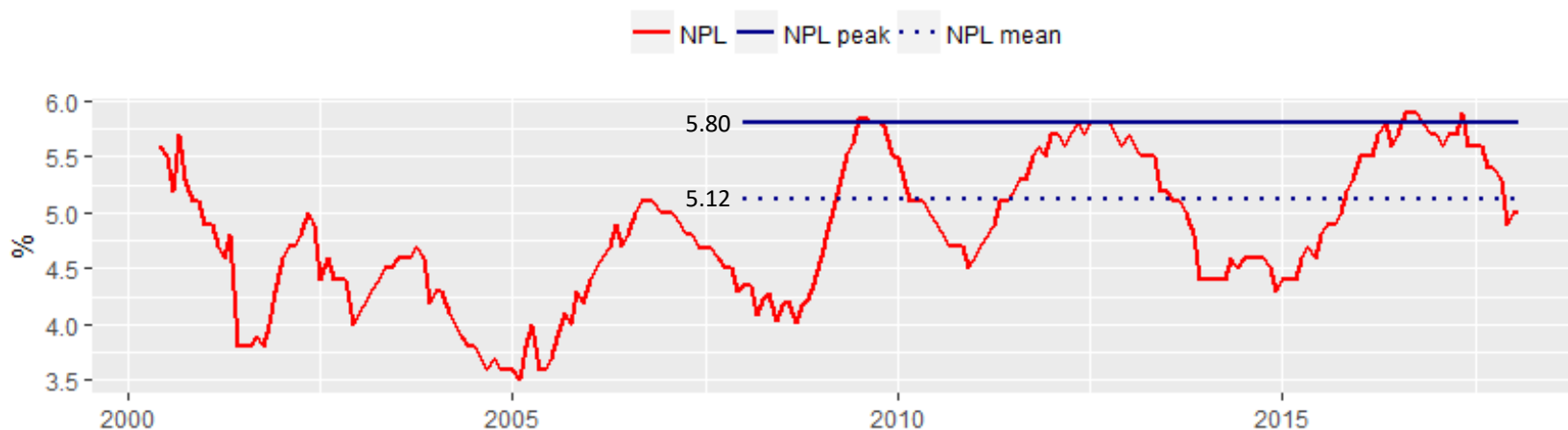
- On tight financial conditions, one might expect an increase in non-performing loan rates, and, thus a surge on the banks' Probability of Default and number of failures.
- When approaching situations like those, it is advisable the DIA increase its share of immediate liquidity.
- We defined situations of bad financial conditions using “decision trees” on the FCI and the 12 months difference of the FCI (to pick rapid deteriorations of the cycle).

By how much

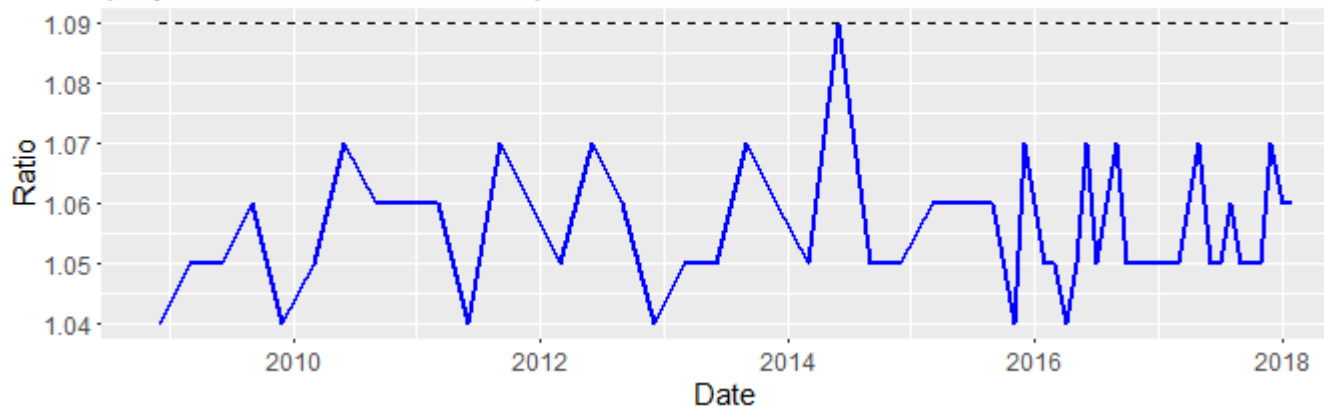
- We thought that one way to calculate the increase in minimum liquidity required by recession times could be achieved by:
 - Computing the ratio of the Worst NPL to Mean NPL (which in the case of Brazil is 1.13)
- 1. **No model:** multiply the factor by the “normal minimum liquidity” to get the down turn minimum liquidity
- 2. **Model:** multiply the factor by the PDs and then apply the Fund Size Investment Model using these augmented PDs to get the down turn minimum liquidity

Financial Cycle and Immediate Liquidity: By how much

NPL - Mean Peak Relation post 2008



Ratio DownTurn to Normal Minimum liquidity (Exposure fixed in fev 2018)



Without Fund Size Model

- Computing the ratio of the Worst NPL to Mean NPL which in case of Brazil is 1,13)
- Apply the 1,13 factor in the Normal Liquidity to get the Downturn Liquidity.

With Fund Size Model

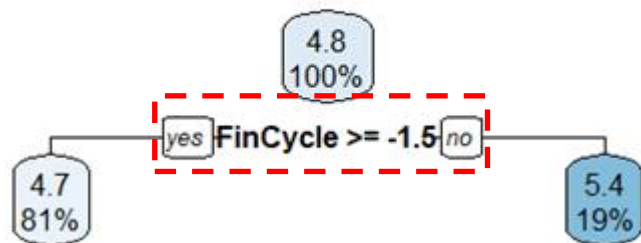
- Computing the ratio of the Worst NPL to Mean NPL (which in case of Brazil is 1,13)
- Apply the 1,13 factor in the banks' PDs (Brazil case)
- Run the Fund Size Model with a time horizon of 3 months (Brazil case)

Financial Cycle and Immediate Liquidity: When

When | Decision trees

- It separates the Financial Cycle in two taking into account the level of the NPL (high or low). The segregation provides the threshold where the recessions start.

NPL split by Cycle



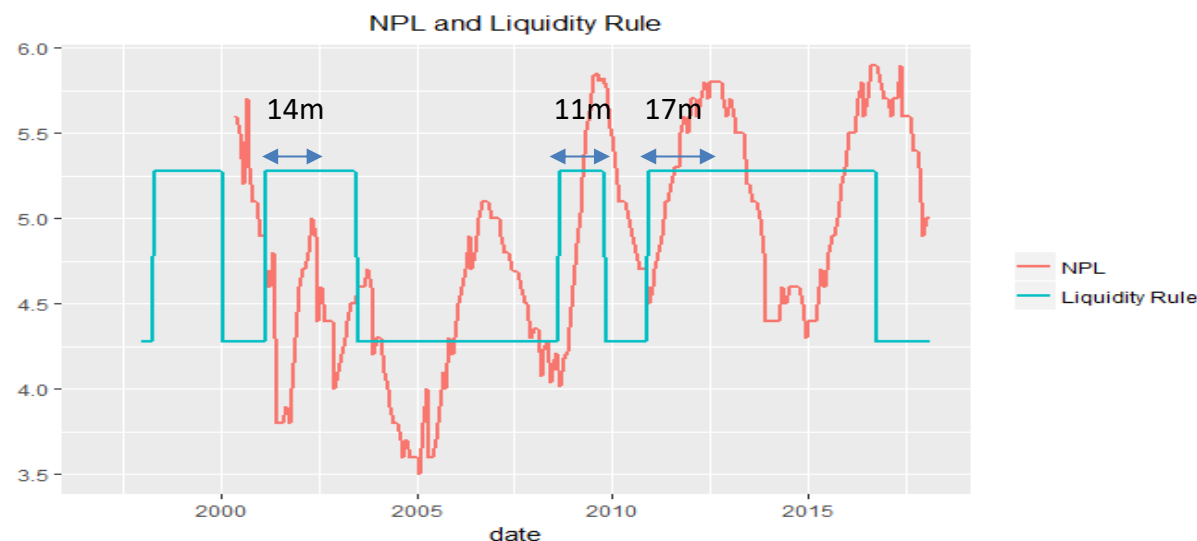
Increase Liquidity when breach one of the thresholds

- Financial Cycle Indicator Below -1.5
- Financial Cycle Variation Below -1.9

Normalize Liquidity when both the criteria below are met

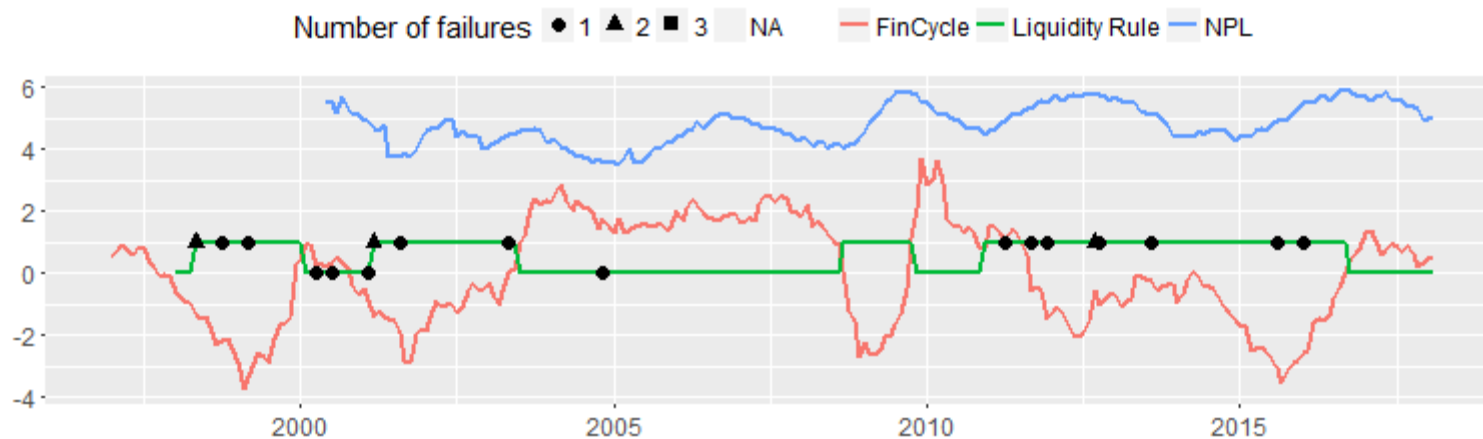
- 3 Months Average of the Financial Cycle Indicator Above 0
- 3 Months Average of the Financial Cycle Variation Above 0

Liquidity Rule Anticipates
NPL Peaks
On average "14 months"

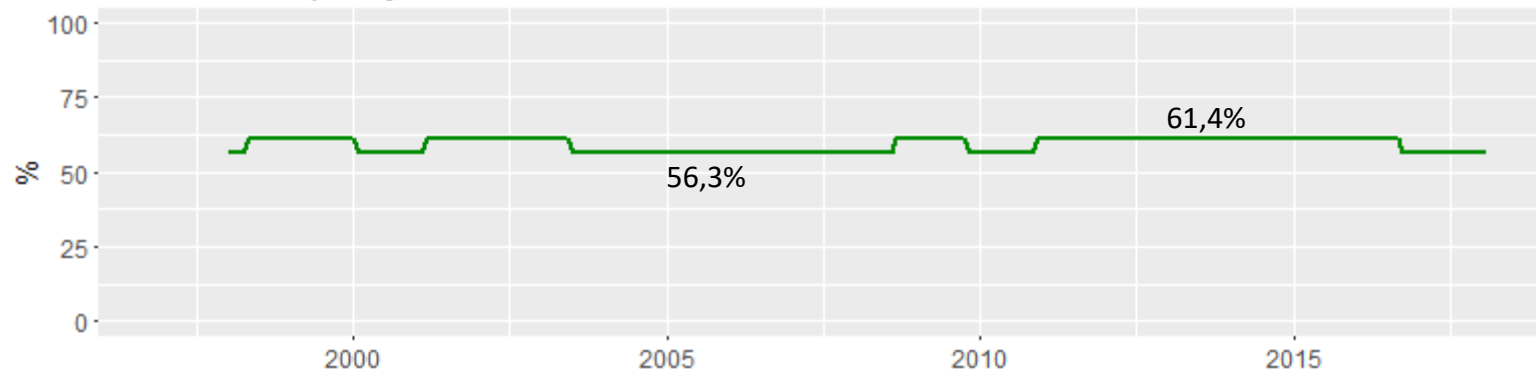


Financial Cycle and Immediate Liquidity: Backtest

Financial Cycle, Liquidity policy, NPL and Default Events



Immediate Liquidity as a function of Fund Size



Data	IF	Tipo
15/05/1998	BANCO BMD	LIQUIDACAO
15/05/1998	BANCO BRASILEIRO COMERCIAL	LIQUIDACAO
30/10/1998	BANCO PONTUAL	INTERVENCAO
23/03/1999	BANCO CREFISUL	LIQUIDACAO
13/04/2000	BANCO LAVRA	LIQUIDACAO
13/07/2000	BANCO HEXABANCO	LIQUIDACAO
07/02/2001	BANCO INTERIOR DE SÃO PAULO	LIQUIDACAO
27/03/2001	BANCO ARAUCARIA	LIQUIDACAO
28/03/2001	BANCO INTERPART	LIQUIDACAO
01/08/2001	BANCO SANTOS NEVES	LIQUIDACAO
22/05/2003	BANCO ROYAL DE INVESTIMENTO	LIQUIDACAO
12/11/2004	BANCO SANTOS	INTERVENCAO
28/04/2011	MORADA	INTERVENCAO
15/09/2011	OBOÉ	INTERVENCAO
02/12/2011	RÓTULA	LIQUIDACAO
14/09/2012	CRUZEIRO DO SUL	LIQUIDACAO
14/09/2012	PROSPER	LIQUIDACAO
19/10/2012	BANCO BVA	INTERVENCAO
02/08/2013	BANCO RURAL	LIQUIDACAO
13/08/2015	BANCO BRJ	LIQUIDACAO
08/01/2016	BANCO AZTECA DO BRASIL	LIQUIDACAO

- There were 21 bank failures in Brazil since 1998, on average 1 default per year.
- The majority of them happened in periods where the rule was telling managers to increase liquidity (on average 1.5 default vs 0.56) and of high NPL (>5%) -> 1.5 vs 0.61.

Conclusions and next steps

- (Immediate Liquidity). The DIAs should determine an amount of immediate liquidity by model or by educated guess
- (FCI). The DIAs should have a methodology to construct a Financial Cycle Indicator. Ideally, this indicator should anticipate increases of the NPL
- (When). The DIAs should increase the immediate liquidity amount when the financial cycle is approaching its trough and decrease it once they have the certainty the bad phase of the cycle is over.
 - **Decision trees** and/or **expert judgment** could be used to define **break-even** points for recessions and booms.
- (By how much). Use the NPL to calculate a **factor** equal to the ratio of the downturn (peak) to normal (mean) NPL rates.
 - For the Brazilian case the factor is 1,13 (and liquidity should be 13% higher).
- Once the financial conditions worsen:
 1. No model: Multiply the NPL factor by its normal minimum immediate liquidity
 2. Model: Run a Fund Size Model with banks' PDs enlarged by the NPL factor;
 - Simulations showed factors of (Downturn to Normal) immediate liquidity ranging between 3% to 9% for the Brazilian case.

Conclusions and next steps

- We intend to continue the investment policy working group to address the general principle #2:
 1. The IP should preserve a minimum level of immediate liquidity in order to respond to a banking crisis
 2. For the resources in excess of the minimum liquidity, the IP should target a strategic allocation aligning the nature and term structure of investments with the other policy objectives of the DIA (returns, diversification, etc...)
 3. Both goals described above should be subject to a tactical allocation taking into consideration current macro conditions, and, more importantly, the phase of the financial cycle
- Debate: Questions to think about on the tables.

Bibliography

- 2017, FGC. LARC Investment Policy Survey for the 2017 AGM at Quebec City. FGC.
- 2017, O’Keefe and Ufier. Determining the Target Deposit Insurance Fund: Practical Approaches for Data-Poor Deposit Insurers. FDIC – Center for Financial Research.
- 2015, Carmen Reinhart. The Antecedents and Aftermath of Financial Crises as Told by Carlos F. Diaz-Alejandro. *Economia*.
- 2014, Reinhart and Rogoff. Recovery from Financial Crises: Evidence from 100 Episodes. *American Economic Review* 104(5): 50–55.
- 2010, Reinhart and Reinhart. After the fall. In *Proceedings: Economic Policy Symposium, Jackson Hole*, pp. 17–60. Federal Reserve Bank of Kansas City.
- 2009, Reinhart and Rogoff. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton University Press.
- 2009, Demyanyk and Hasan. *Financial Crisis and Bank Failures: A review of prediction methods*.
- 2008, Maitra S. and Yan J.. *Principle Component Analysis and Partial Least Squares: Two Dimension Reduction Techniques for Regression*. Casualty Actuarial Society, Discussion Paper Program.

Thank you! Gracias!

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