EVALUATION OF THE CENTRAL BANK OF CHILE'S FINANCIAL STABILITY REPORT

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This is the report of my evaluation of the Bank of Chile Financial Stability Report. The issues I was asked to cover are in Annex 1. I visited the Central Bank from May 15 through May 18, 2017 and had a full schedule of meetings with managers and staff in the Financial Policy Division, President and several board members, bankers and other readers of the FSR, Ministry of Finance officials and others. I want to thank all those I met with and interviewed during my visit, their extremely professional attitude, candid views and many excellent suggestions for improving and communicating the results of the FSR.

The Central Bank of Chile produces an excellent Financial Stability Report. The recent IMF Working Paper 17/73 reviewed and ranked 19 Financial Stability Reports in the Latin America and the Caribbean. Chile's FSR was ranked first out the 19 countries! Readers of the report praise its strong content, useful trends in international and domestic markets, broad coverage, useful data on financial sector/credit users/debt trends/housing sector developments, etc. The IMF team who wrote WP 17/73 gave scores for the ranking of Chile's FSA which are described and discussed in Annex 2.

Contents and Structure of the FSR

Reviewing the FSRs for the balance between recent state of the financial system versus risks faced going forward, my personal view (and that of the IMF colleagues who wrote the IMF WP) is that there is too much emphasis on the recent state of the financial system and too little emphasis on risks faced going forward. My IMF colleagues commented the FSR tends to be "descriptive and backward looking." More emphasis could be placed on "forward-looking risk assessment" for the banking sector, non-bank financials, corporate and household sectors. It would be good to place more emphasis on the non-bank financial sector risk assessment.

There are concerns about the process of deciding on and producing the Boxes in the FSR. During my interviews, several staff mentioned the process of voting on which Boxes to include and the fact that the Boxes are chosen late in the process of preparing the FSR has led to the view the "Boxes are not very good and do not receive enough preparation." I understand the Boxes are mandated to be short.

I recommend creating a separate chapter in the FSR on special topics which would change from issue to issue. In several of my discussions many people supported the idea of a separate chapter of the FSR on special topics. It would allow more preparation time for the special topics and take pressure off special topics only being put into short Boxes. The IMF GFSR has two full chapters that have special topics that change with each issue. Having one special topics chapter in the FSR would give flexibility and would make the report more interesting. In the production of the GFSR in the IMF, it is common practice to start special topics projects one year ahead. The strategy here is to start with plenty of lead time and while the intention is to prepare a chapter for the GFSR one year ahead in some cases the work ends up producing a Working Paper (or just a Box) instead if the chapter if circumstances change or the research does not pan out as expected. The point is to have a diversification strategy for the chapter on special topics. I would recommend that the Financial Policy Division consider this approach.

I would recommend merging Chapters I and II. Chapter I and II seem detached and merging the external environment and external risks with developments and risks in local markets would be a way to connect external global developments with what is going on in Chile. It is useful to understand how changes in the global environment may impact (or not impact) Chile's financial sector and economy.

Combining the recommendation to merge Chapters I and II and the recommendation to add a chapter on special topics leads to the following revised FSR outline:

Summary

Chapter I – International and Domestic Financial Situation

Chapter II – Credit Users

Chapter III – Banking System

Chapter IV – Special Topics

Chapter V – Financial Regulation

Chapter VI – Payment Systems (second half of year FSR)

I see no need to adjust the topics or tone addressed by the Financial Regulation or Payment Systems chapters.

Consider making the Summary longer. Many of the FSRs from different counties and the GFSR have longer summary section than the Bank of Chile FSR. It seems unnecessarily short. Some of the private sector readers of the FSR say many people read the MPR and only the summary of the FSR so a slightly larger summary could get more messages to those who typically only read the summary. If a special topics chapter is added, then the Summary could include an overview of the Special Topic as well as the financial stability messages. I understand that FSRs published during 2004-2013 had longer summaries than FSRs published in the last few years.

The support material is useful. The judgments are well supported by the information provided in figures and tables. The colorful charts are clear and communicate useful information and trends. I agree with some of the readers of the FSR that a "spider diagram" should be added, like Figure 1.1 in the latest GFSR the financial stability map risks and conditions. The statistical annex is useful. One comment from readers of the FSR say that they can access data to many FSR charts on the website but the downloaded data series show only the time period in the chart or graph. They asked that the time series of the downloaded data be longer, ideally the full-time series, not just the time period in the FSR figure/graph.

<u>Communication of the results of the FSR to the public</u>

Currently the FSR is released at the same time as the Monetary Policy Report (MPR). I recommend that the FSR be released at a different time than the MPR. I would suggest moving the release of the FSR to May and November each year. In discussion with readers of the FSR from the private sector it was pointed out that the journalists eagerly read the MPR and but do not get around to reading the FSR until later. FSR messages are frequently drowned out by the MPR messages. Also, it can be awkward to mix the messages and tone of the MPR, with an objective of communicating price stability, and then immediately switch to messages from the FSR which relate to risks/tail-risks and uncertainty. Having the FSR presented at a different time would allow for more effective communication of the FSR results. Ideally the FSR would be launched with a press conference and/or audio visual broadcast posted on the website. Separating the release of the FSR from the MPR would allow the publication dates of future FSRs (point E2 in IMF WP).

I recommend to increase communication of FSR issues in speeches to the public by board members or senior staff throughout the year. It would be useful to reach out more, and have discussions with, non-bank leaders/players (such as managers in mining companies, manufacturing companies, housing companies, insurers, portfolio managers, etc.). The readers of the FSR I met gave me the impression that those most interested in the FSR are those in the banking industry but that people in the non-banking area (corporates/pension funds/housing) were not as interested in the FSR. They suggested increasing content for CFOs of non-banking companies. One suggestion I liked was "the Bank of Chile should host "breakfast discussions" occasionally with non-bank leaders/players (managers in mining companies, manufacturing companies, housing companies, insurers, portfolio managers, etc.) and get their views on risks in their industries. This could help get ideas for additional content/risks for the FSR, as well as advertising for the published FSRs. This might help adjust the content so that those in the non-banking sector would be more interested in reading the FSR in the future.

Process

The frequency of publication of the FSR every six months is optimal.

The banking sector stress tests are well designed and sufficiently severe adverse scenarios are used. The frequency of the stress tests is appropriate. Comments by the readers of the FSR, and mentioned in the IMF WP, were that more information should be provided by the Central Bank on the details and assumptions used in the stress tests. The publication of the paper on this topic in May 2017 takes care of this concern.

Several of the readers of the FSR I interviewed thought that more information on how Basel III will affect bank capital ratios should be included in the FSR. Maybe this can be done in the second half of 2017.

Regarding risk identification, both top-down and bottom-up analysis should be used. It is important to have a process of using forward-looking analysis of external and domestic macroeconomic trends which are linked to key risk exposures in the banking, non-bank financial, corporate, household sectors, and the sovereign. To quote Robert Merton, "risk exposures are a forward-looking measure of how much money could be lost due to market risk, credit risk, liquidity risk, or certain operational risks." Bottom-up risk exposures for sectors should be built up from the bottom, institution by institution to the extent possible. Financial stability analysis is thus an integrated process of macroeconomic trends/potential changes linked to the changes/potential increase in risk exposures of sectors. The process requires measuring and analyzing the risk exposures and linking this to the potential policies that mitigate these risks.

I would suggest additional risk monitoring tools that combine market data and balance sheet data, such as the contingent claims analysis (CCA) models. These models are well known to the Central Bank staff, for example the 2010 Central Bank of Chile book "Financial Stability, Monetary Policy, and Central Banking," the paper by Gray, Garcia, Luna and Restrepo (Incorporating Financial Sector Risk into Monetary Policy: Application to

Chile) which utilizes the distance-to-default measure in the Chilean banking system (FSR second half of 2006 by Gray, Echeverria and Luna). CCA is described in another paper in the 2010 book by Gray, Merton and Bodie (Measuring and Managing Macrofinancial Risk and Financial Stability; A New Framework). These types of indicators combine leverage measures with volatility in a distance-to-default indicator which can be used to calculate default probabilities, credit spreads and other risk indicators. There are commercial versions of these risk indicators (CreditEdge and Kamakura), Singapore University and a Bloomberg version (DRSK). This would facilitate the increased use of systemic risk interconnection and spillover models using market data and CCA based risk indicators (models such as Granger causality, Diebold-Yilmaz, CoVaR, etc.)

I would suggest that supplemental training should be provided in financial risk management for selected staff in the Financial Policy Division. I have noticed that when most staff in central banks have economics degrees. Additional training on quantitative financial risk management is very helpful. It complements the economics traning and helps create a culture of true risk analysis. One good way to do this is to encourage and support staff to get a certification in Financial Risk Management, a certificate offered by the Global Association of Risk Professionals (it's like a Certified Financial Analyst but for risk managers). It can be earned while continuing to working by utilizing online course material leading up to taking a test to earn the FRM certification. I did this myself in 1999 as have many of my colleagues and my Research Assistant. It balances macro training by instilling a concrete understand of market risk, interest rate term structure risk analysis, credit risk analysis and operational risk. Another organization that provides risk management training is PRMIA offering RMA risk certifications.

I would recommend preparing a comprehensive three-year or five-year plan for the Financial Policy Division. This plan would identify goals, strategy and resources for both FSR production activities, as well as for risk analysis and financial stability work that is not FSR oriented but needed to identify new risks to payments systems, international spillovers, potential risks in domestic and foreign derivatives markets and other activities. This plan would look at long term goals and resources needed to reach these goals both for core activities, as well as the strategy and resources to identify and get a one-year or more head start on special topics which may go into a future Special Topics chapter or could result in another product such as Working Papers/internal confidential analysis. This plan would include a strategy and plan to study important new areas that may have an impact financial stability, in particular FinTech credit and mobile payments (described in FSB CGFS document May 22, 2017) and cyber risks. My recent work and discussions with several managers and staff at the Central Bank emphasized the importance of understand the evolution and potential impact on credit market structure and activities of FinTech and mobile banking as well as a need to get more information and expertise on cyber threats, especially potential cyber risk threats to the payments system. From my discussions, it does not appear that the Financial Research Area contributes much to the FSR. The Financial Research Area could contribute more to the areas described above, (i) getting a head start on special topics which may go into a Special Topics chapter, and, (ii) new topics related to financial stability such a FinTech, Cyber risks, derivative/CCP risk domestically and internationally. I was presented with the list of topics and outputs of the Financial Research Area many of which look to be of high quality. The household sector work is impressive and useful. However, some of them seemed to be more macro oriented/trade/flow type research that would normally be in a Bank Research Department. The suggested three-year or five-year plan should review and consider how outputs of the FRA can support the FSR productions process, as well as help analyze new threats to financial stability. The plan would discuss the budget needs to meet the three-year/five-year goals of the Financial Policy Division in the most cost effective way possible. This plan would include training, learning and skill improvement for FPD staff (the financial risk management training is one such area I described above). This plan could very well conclude that additional resources need to be allocated to the Financial Policy Division.

Thank you for the opportunity to prepare this evaluation. I would be pleased to provide more suggestions or answer any questions.

Dale Gray, June, 12, 2017

Annex 1

Specifications of the issues needed to be covered in the evaluation of the Chilean FSR:

A. Contents

1. Balance of contents of the FSR
    a. Are accountability* and risk assessment** properly balanced?
    b. How broad and detailed should accountability* of covered markets be?
    c. How deep should risk assessment** on each of these markets be?

2. Support material:
    a. Are judgements well supported by the information provided in figures and tables?
    b. Is the statistical annex useful?
    c. Are models for risk assessment over or under used?
    d. Is the technology used on any parts of the FSR obsolete – should it be improved?

B. Process

1. Are the following items in optimal levels, or should they be increased/reduced?
    a. frequency and dates of the publication
    b. elaboration period
    c. team size
    d. bank stress testing frequency

2. Should risk identification be led in a bottom-to-top way or the other way around?

3. Evaluation of the coordination/cooperation between units of the Financial Policy Division and Research Division.***

*recent state of financial system
** risks faced going forward
***no meetings with Research Division were held so this task was not carried out.

Annex 2

The scoring of the Central Bank of Chile's FSR by the IMF authors of IMF WP 17/73 for five different areas is show on the next page (page 10). Scores range from 1 (lowest) to 4 (highest). The Central Bank of Chile's FSR overall composite score was the highest of the 19 countries in the survey. The sections highlighted on the next page are the areas where the IMF authors gave the FSR a score of 2. The scores are discussed below.

The A category includes the aims, objectives and reasons. A1 through A4, and A7 all received a top score of 4. A5 and A6 received a score of 2, relating to the definition of financial stability. My view is that this scoring is a bit too harsh. However, it might be helpful to review the define financial stability in general and operational terms in the FSR or on the FSR website.

The B category is on the overall financial stability assessment. B1 to B3 receive a high score of 3. In my view the FSR does a fine job in these areas.

The C category is on issues. C1 is on whether the report clearly identifies macro-relevant stability issues. I think there could be a bit more on linking the external and domestic macro issues to the forward-looking risks in the economy. However, the 2013 (second half) FSR does give a clear identification of external and domestic macro-relevant key risks and resilience factors. On C3 regarding the coverage which received a 2 score the notes of the WP authors mention that the non-bank financials are not covered and neither is the payments system. I disagree with this statement and I disagree with the low score. The FSR is comprehensive in its coverage of non-financial sector, non-bank financial institutions, and the payments system (discussed in the second half of the year FSRs).

Categories D1, D2, D4, D6 receive high scores. D3 gets a score of 2 and notes indicate that more information should be provided by the Central Bank on the details and assumptions used in the stress tests. The publication of the paper on this topic in May 2017 takes care of this concern. On D5 it I my view that the report does use available data including those on individual institutions.

In the E categories on structure and other features, particularly E5 which received a 2 score, the notes of authors of the WP point out how there should be more detailed discussion of macro-linkages in identification of key risks and less of the 'silo' approach. Separating the release of the FSR from the MPR would allow the publication dates of future FSRs (point E2 in IMF WP).

Element / Category	Chile	*weighted*	Sample average	*weights*
Overall composite score	**3**	**3**	**2.225**	1
A. Aims, Objectives, and Reasons	3.429	0.72	2.086	0.21
B. Overall Assessment	3	0.60	2.15	0.2
C. Issues	2.353	0.40	2.112	0.17
D. Data, Assumptions, and Tools	3.000	0.90	2.267	0.3
E. Structure and Other Features	3.167	0.38	2.65	0.12
A1. The aims of the report should be clearly indicated	4	0.12	2.55	0.03
A2. The definition of financial stability should be clearly indicated	4	0.12	2.05	0.03
A3. The definition of financial stability should be a standard part of the report, presented consistently across reports	4	0.12	2.05	0.03
A4. The statements of aims should be a standard part of the report, presented consistently across reports	4	0.12	2.75	0.03
A5. The definition of financial stability should be cover both the absence of a crisis and the resilience to a crisis	2	0.06	1.65	0.03
A6. Financial stability should be defined both in general terms and in operational terms	2	0.06	1.55	0.03
A7. The aims of the reprot should be comprehensive	4	0.12	2	0.03
B1. The overall assessment should be presented clearly and in candid terms	3	0.15	2.15	0.05
B2. The overall assessment should be linked to the remainder of the FSR	3	0.15	2.25	0.05
B3. There should be a clear link between the assessments over time, making it clear where the main changes took place	3	0.15	2	0.05
B4. The overall assessment should cover the key topics	3	0.15	2.2	0.05
C1. The report should clearly identify the main macro-relevant stability issues	2	0.10	1.9	0.05
C2. The coverage of issues should be consistent across the reports	3	0.18	2.4	0.06
C3. The coverage of the financial system should be sufficiently comprehensive	2	0.12	2	0.06
D1. It should be clear what data are used to arrive at the results presented in the reports	4	0.20	2.5	0.05
D2. It should be clear what assumptions are used to arrive at the results presented in the reports	3	0.15	2.05	0.05
D3. It should be clear what methodological tools are used to arrive at the results presented in the reports	2	0.10	2.3	0.05
D4. The results should be presented in a consistent way across reports	4	0.20	2.2	0.05
D5. The report should use available data, including those on individual institutions	2	0.10	2	0.05
D6. The report should use the available tools	3	0.15	2.55	0.05
E1. The structure of the report should be easy to follow	3	0.06	2.75	0.02
E2. Other features of the report (e.g., its length, frequency, timing, public availability and links to other central banks reports) should be designed to support its clarity	3	0.06	2.3	0.02
E3. The structure of the report should be consistent across time to make it easier to follow for repeat users	4	0.08	3.1	0.02
E4. The other features of the report should be designed to support its consistency	3	0.06	2.55	0.02
E5. The structure of the report should allow coverage of the key topics	2	0.04	2.45	0.02
E6. The other features of the report should be designed to supports its coverage	4	0.08	2.75	0.02