FINANCIAL SECTOR ASSESSMENT PROGRAM

CHILE

TECHNICAL NOTE: THE BANKING SECTOR—RISK EXPOSURES AND INDUSTRY PRACTICES CONDUCIVE TO EFFECTIVE RISK BASED SUPERVISION

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I. INTRODUCTION

1. **The aim of this paper is twofold: (1) to provide an analysis of the soundness of the banking system in Chile given current risk exposures; and (2) to summarize the mission's views and comments on the risk management and disclosure practices of the Chilean banking industry.**[1]

2. **Reflecting the above, the first section of this chapter studies the resilience of the Chilean banking system to a series of shocks, given its current risk exposures.** It also contains the mission recommendations regarding further improvements in the supervisory stress testing methodology. The second section describes the risk management practices of banks based on survey responses and contains the team's recommendations in light of the banks responses. It also compares the disclosure practices of the largest Chilean banks with the practices of international banks and contains the mission recommendations to further improve disclosure in the new risk-based supervision environment.

II. AN ANALYSIS OF THE BANKING SYSTEM'S SOUNDNESS GIVEN CURRENT RISK EXPOSURES

A. Analysis Methodology and Results

3. **To assess the potential effect of macroeconomic shocks on the Chilean banking system, a comprehensive stress testing framework was designed and implemented.** A working group formed by the mission staff, as well as staff from the Superintendencia de Bancos e Instituciones Financieras (SBIF) and the Banco Central de Chile (BCCh), identified the relevant risk exposures to be stressed and agreed on the methodology and the size of the shocks applied. The relevant exposures for the Chilean banking system included exposures to exchange rate, interest, and credit risk.[2] The stress testing exercise designed comprised both sensitivity and a scenario analysis. The sensitivity analysis gauged the effect of increases in provisioning expenditures, changes in interest rates, and a move in the exchange rate, given the Chilean banks exposures at end-December 2003. These tests were supplemented by an analysis of the financial data of companies registered with the Superintendencia de Valores y Seguros (SVS).[3] In addition, a scenario analysis in which the economic conditions deteriorate due to a decrease in the terms of trade (TOT) was also performed. Banks liquidity was assessed by calculating the share of potentially volatile liabilities that finance illiquid assets

[1] Prepared by Eva Gutiérrez. Silvia Ramírez contributed to the discussion of banks disclosure practices.

[2] Given prudential limits, equity exposures, direct conglomerate exposures, and contagion risks from financial subsidiaries are not significant.

[3] These companies accounted for about 34 percent of bank lending to the corporate sector in 2003 as measured by their consolidated balance sheet. Information on bank loans of individual companies by bank was available.

and the banks' cushion in terms of liquid assets to sustain a switch from term to sight deposits, given the requirement to constitute technical reserves.[4] The exercise comprised all banks incorporated in Chile, including foreign branches.

4. **Chilean banks appear resilient to market risk arising from exchange and interest rate movements, partly due to prudential limits on foreign currency and interest rate risk exposures.** Sensitivity analysis looked at the direct impact on banks' CAR, excluding secondary round effects through deterioration of credit quality, of movements in the exchange rate, and simultaneous movements in the domestic and foreign interest rates (see Table 1).[5] As of December 2003, half of the banks had a net short-open position lower than 10 percent of Tier 1 capital, while only the foreign subsidiaries had substantial large long-open positions. The results of the tests indicated that no bank saw its solvency ratio seriously affected in the event of devaluation, while in all cases, the CAR improves in the event of an appreciation due to the decrease in the value of the risk-weighted assets denominated in foreign currency. The effect of interest rate shocks was studied by (i) imputing to profits the changes in value in the trading portfolio and the gain or loss due to the difference in the time to repricing of assets and liabilities, and (ii) imputing to capital the changes in the value of the investment portfolio. The results indicated that all but three foreign subsidiaries and one domestic bank profit from a decrease in interest rates while, increases in interest rates would not seriously impact the solvency of any bank. As it is typically the case in this type of exercise, the analysis did not take into account basis and prepayment risks.

5. **Credit risk appears to be the main risk exposure of Chilean banks. In some simulations, deterioration of the credit quality of borrowers may affect the solvency of some banks.** Two sensitivity analyses to credit risk were conducted. The first analysis assumed an increase in provisioning expenditures equal to the highest annual increase experienced in the last five years.[6] The results indicated that only two small banks, accounting for 0.15 percent of banking system assets, will see their CAR dropping to the 8 percent to 10 percent range (see Table 1). The second sensitivity analysis used the detailed balance sheet information of banks' borrowers registered with the SVS. The corporate sector data indicated that a small proportion of companies had debt servicing difficulties in 2003.

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[4] Chilean banks are obliged to constitute a technical reserve, with highly liquid assets, if sight deposits exceed two and a half times the bank Tier 1 capital.

[5] However, the scenario analysis described in paragraph 6 accounts for the effect of interest rate increases and exchange rate depreciation on the quality of credit. The impact of exchange rate depreciation on the credit quality of corporates was also studied using individual corporate data (see paragraph 5).

[6] The shock is equivalent to a deterioration in economic conditions that result in an increase in provisioning ratios as that experienced in the period from mid-1998 to mid-1999.

Six and a half percent of companies in the sample that were borrowing from 16 of the banks operating in Chile had earnings before interest, depreciation, taxes and amortization (EBIDTA) lower than their interest expenses in 2003, and about 2.5 percent of total loans were owed by companies with negative EBIDTA.[7] A decline in the operating margin of 5 percent would raise the number of companies under distress to about 10 percent. Four banks, accounting for 21 percent of banking system assets, appeared to be particularly exposed to companies that could potentially enter in distress and became undercapitalized under the exercise. In addition, the effect of a depreciation on the quality of corporate loans was assessed. A twenty five percent depreciation, given corporates' net foreign position, will result in the distress of 4.9 percent of loans due by corporate firms. As a result one bank, holding 0.3 percent of assets will see its CAR dropping below the 8 percent regulatory minimum, while 5 banks holding about 33 percent of the system assets will see their CAR dropping to the 10 to 8 percent range.[8]

6. **Overall, Chilean banks were found to be resilient to a relatively large external shock**. No bank becomes undercapitalized in the event of a 10 percent annual decrease in the TOT that results in currency depreciation, an increase in interest rate, a GDP contraction, and unemployment increase (The impact of a TOT decline on these variables was estimated using the macroeconomic model of the BCCh). The first two effects impact banks directly through their market risk exposures, while the last three affect banks provisioning expenditures.[9] Three banks accounting for 25 percent of banking system assets will see their CAR decrease to the 8 percent to 10 percent range (see Table 1).

7. **However, Chilean banks depend heavily on large deposits, largely from the AFPs, to finance their loan portfolio, which could result in a liquidity problem in the event of a decrease in their CAR levels**. Most banks have a positive funding volatility ratio (FVR) for both domestic and foreign currency. The positive ratio, which indicates the share of illiquid assets financed with potentially volatile liabilities, is larger than 40 percent for several banks (see Figure 1).[10] Deposit concentration, largely due to the large AFPs bank

[7] The 16 banks for which balance sheet data on specific borrowers was available amounted to 98 percent of banking system assets.

[8] For details on the calculation of loans entering in distress in the event of a depreciation, see technical note on corporate sector issues.

[9] BCCH uses an empirical model to estimate the impact of interest rates, GDP and unemployment shocks on bank provisions. Changes in exchange rate were not found to be a statistically significant determinant of provision expenditures.

[10] The FVR is defined as ratio of potentially volatile liabilities, net of liquid assets, to illiquid assets. The potentially volatile liabilities include interbank deposits and deposits not covered

(continued)

deposits, explains these quite large FVRs. Given that AFPs can not invest new funds, by regulation, in banks whose CAR falls below 10 percent, a marginal decrease in the CAR ratios as the one experienced under the TOT shock, could result in liquidity problems for some banks.

8. **In addition, a switch from term deposits to sight deposits might create liquidity tensions for some banks due to the need to constitute additional technical reserves with liquid assets.** At end-December 2003, six banks constituted technical reserves. A 15 percent switch of uninsured term deposits- not held by AFPs- to sight deposits will require additional technical reserves from these banks, as well as from 6 other banks.[11] Three banks holding 27 percent of total banking system assets will lack liquid resources to constitute the additional reserves, and will need to borrow up to 19 percent of their Tier 1 capital, and in one case, to satisfy the reserve requirement.

B. Mission Recommendations for Improving the Stress Testing Framework

9. **The mission encourages the authorities to use the stress testing framework developed for the Chilean FSAP on a regular basis and to continue working to improve it.** The analysis can be conducted on a quarterly or semiannual basis as part of the SBIF's off-site monitoring system. The joint SBIF and BCCh stress testing group should be responsible not only for periodically revising and designing new sensitivity tests and scenarios, but also for further improving the framework. Suggested improvements include:

- ***Foreign exchange risk in the corporate sector***. The assessment of the indirect exchange rate risk faced by the financial system would be substantially improved if data on the foreign exchange position of banks' corporate clients were estimated using available information for SVS registered companies. In addition to the stress testing exercise, to monitor the systemic risk an aggregate indicator could usefully be collected. The key encouraged financial soundness indicator in this area is corporate net foreign exchange exposure as a ratio to equity.

- ***Determinants of corporate profitability***. Monitoring profitability conditions in the corporate sector is useful to anticipate deterioration of asset quality and bank profits. Econometric studies linking changes in macroeconomic conditions to changes in corporate profitability would also help to refine the sensitivity analysis for credit risk that uses individual borrower information.

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by the deposit insurance. Interbank assets, deposits with the BCCH, and holdings of liquid paper were included as liquid assets.

[11] Deposits ensured by the insurance scheme are assumed to be stable. Term deposits held by AFPs are assumed not to switch to sight deposits either, due to AFP investment restrictions that require AFPs to invest in yielding assets.

- ***Determinants of bank profitability*** . In general, changes in the profitability across the sub-sectors of the financial system need to be better monitored. As regards the banking sector, a breakdown of banks' profits by business activities would enable a better analysis of the sources of their income. An econometric study linking bank profitability to macroeconomic conditions would help to refine the sensitivity and stress test scenarios.

- ***Determinants of provisioning expenditures.*** The existing BCCh study on determinants of provisioning expenditures was very useful to calculate the effect of macroeconomic shocks on provisions. However, the analysis could be further improved upon by conducting a similar study differentiating between types of loans (i.e., consumer, commercial, real state, etc). Analysis of the corporate sector data suggests that the effect of a depreciation on provisioning for corporate loans might not be negligible.

- ***Maturity and concentration of deposits.*** Improving data availability on banks' liabilities would help refine the methodology of the liquidity stress tests. Currently, it is assumed that banks' share of term deposits maturing short term equals to the average share observed for the banks constituting technical reserves. Also data on the concentration of term deposits would help better calibrate the shock.

III. Industry Practices Supporting Risk Based Supervision Framework

A. Risk Management Practices in Chilean Banks

10. **A survey of risk management practices in banks operating in Chile was conducted during the FSAP mission**. Based on a questionnaire proposed by the team before the mission and follow-up discussions with the authorities, a survey was conducted of risk management practices in the 26 banks operating in Chile, of which 20 banks responded. Respondents were grouped into large banks, small and medium domestic banks, and small and medium foreign subsidiaries and branches. The groups included 5, 7, and 8 banks, respectively.

11. **Chilean Banks are more advanced in the use of sophisticated techniques for the management of market risk, while credit risk management techniques are still developing.** Most of the banks report using VAR models for managing market risk; credit risk modeling is not widely use (Figure 2). Most banks use financial statement information to classify corporate loans, with leverage and earnings capacity among the most followed ratios. Only medium and small foreign subsidiaries and branches use the indicators determined by a model, mostly inherited from the parent. Approximately a third of the banks estimate unexpected losses in the portfolio, although the responses suggested that some banks confuse the concept of unexpected losses with the concept of expected loss. Stress tests on the corporate loan portfolio are not common practice. Regarding consumer loans, most banks classify them as category A at inception, with few banks controlling for negative information

available on the client. Few banks currently use a model for following these type of credits, and stress testing, with the exception of small foreign banks branches and subsidiaries, is rare.

12. **However, there are considerable differences in the risk market management techniques of banks.** While almost all large banks and foreign subsidiaries and branches measure market risk with VAR models, only about 40 percent of the small and medium domestic banks use this technique. The differences may reflect to some extent differences in the composition of the bank portfolio across these banks. Nevertheless, most of the small and medium domestic banks that use VAR do not seem to follow industry standards. Only half of them consider correlations among the risk factors: the average time length of the historical data used is only half a year; and back testing is rare. Given the simplicity of the derivative products held by banks, mainly NDFs, most of them assume normality in the distribution of returns, and Monte Carlo simulations are the exception. Interest and exchange rates are the main risk factors considered.

13. **Stress testing is yet to be fully integrated in banks' risk management practices.** While all banks report that they conduct stress testing, only less than 60 percent of the medium and small domestic banks report details regarding the shocks they consider, and they report using the stress testing to better understand the bank's risk profile and communicate it to management. In general, stress tests are not widely used to allocate limits of set-up capital. Almost all banks report capturing risks in trading and banking books. However, given the size of the interest rate shocks reported and the fact that many banks do not conduct stress testing in their credit portfolio, it seems that only the group of small and medium foreign subsidiaries and branches truly capture some of the risks in the banking book. Parallel shifts in the domestic interest rate curve, followed by movements in the exchange rate, are the most popular shocks. However, most large banks also test for twists in the domestic rate curve. Although 70 percent of banks reported to use stress tests to monitor liquidity risk, only 15 percent reported scenarios that specifically look at events of stressed liquidity.

Mission recommendations

14. **While moving forward toward a more risk-based supervision framework, the mission encourages supervisors to engage in discussions with banks with a view to upgrade the standard of risk management practices in the industry.** All banks, in general, could upgrade their practices regarding credit risk management and also market risk management, if structured products are going to develop further. Regulators should encourage integration of stress testing in the risk management practices of the banks and ensure that the major exposures, typically credit exposures, are stressed. Supervisors should engage in discussions with small and medium domestic banks to upgrade their risk management practices with a view to promote a level playing field under the new risk-based supervision framework. Supervisors should also ensure that those practices are approved and understood by the banks' management.

B. Disclosure Practices in Chilean Banks

15. **Disclosure of banks' financial information helps to enforce prudential standards by promoting market discipline, and it is particularly useful in risk-based supervisory frameworks.** Market discipline is an effective tool to limit excessive risk taking by banks, particularly in countries with a generous government safety net.[12] Market discipline becomes even more fundamental within the current tendency to move away from hard prudential limits toward a more risk-based supervision framework in which banks establish their own policies regarding risk tolerance and risk management, and supervisors validate such policies and procedures. In recognition of this fact, disclosure requirements are being introduced in the new capital accord.[13]

16. **The SBIF discloses extensive and frequent information regarding banks' capital structure and capital adequacy, as well as accounting policies and geographical diversification.** The extent of disclosure on these areas by the Chilean banks, compares favorably with disclosure by large international banks (see Figure 3).[14] Moreover, with the exception of accounting policies, which are disclosed annually, information is mostly disclosed on a monthly basis. Information regarding asset quality is disclosed also monthly, in particular, NPLs and provisions. However, definitional issues prevent international comparisons of these variables since NPLs in Chile only include the past due portion of outstanding loans. The SBIF also discloses the banks' risk index which consists of a weighted average of the loans classified in the riskier categories over the total loans and accrued interests (see Figure 4). The weights on the loans increase the riskier the loan classification. However, the information does not exactly reflect credit exposure since information on collateral and loan guarantees is not available.

17. **Mandatory disclosure of detailed information regarding risks exposures and risk management techniques is not required, and disclosure levels vary widely among the largest five banks.** While the three large banks that are quoted on the NYSE disclose this information in their SECF-20, only two of them make this information available in Chile, and none make the information available in Spanish. In particular, information regarding average balances of derivative activities, volume and type of securitized assets, and exposure to interest and exchange rate risk was only available through the SECF-20 for two banks. Information regarding income by business line, (i.e., treasury, commercial and consumer

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[12] See for example http://www.bis.org/bcbs/events/wkshop0303/p10nierbaum.pdf.

[13] See Section VII. 5.b for details.

[14] The comparison is made using the framework of the BIS survey of disclosure practices. For details see "Public Disclosures by Banks: Results of the 2001 Disclosure Survey," Basel Committee, May 2003. The disclosed material reviewed for the comparison included SBIF publications, banks annual reports, and banks SECF-20 when available through their web site.

loans) is also generally lacking. Regarding risk management techniques, only one of the largest banks discusses them in its annual report issued in Chile and discloses its average VAR, while two other banks disclose it on their SECF-20.

Mission recommendations

18. **As part of the process to move toward a risk-based supervision framework, Chilean banks should considerably enhance the disclosure of banks' risk exposures and risk management techniques**. To this end, consideration should be given to review and rationalize the informational requirements that the SBIF imposes on banks for subsequent publication through the SBIF reports. Reporting requirements should be focused on banks' risk exposures as generated by banks' new information systems. Consideration should be given to adopting reporting standards, for material exposures, similar to the standards imposed on bank-holding companies by the U.S. Securities and Exchange Commission (SEC), given that the three of the largest banks already produce reports according to these standards.[15] Also the report from the Multidisciplinary Working Group on Enhancing Disclosure provides detailed recommendations for the disclosure of risk exposures by financial firms[16]. In addition the SBIF supervisory reports could be moving toward the discussion of the level and trends of risks exposures of the system.[17]

[15] See http://www.sec.gov/divisions/corpfin/forms/industry.htm, and http://www.sec.gov/rules/final/33-7386.txt

[16] See http://www.iaisweb.org/02disclosure.pdf.

[17] See for example, the financial stability report published by the Bank of England http://www.bankofengland.co.uk/Links/setframe.html

Table 1. Chile: Stress Test for Market and Credit Risks

Variables Stressed	Senstivity Analysis							Scenario Analysis
	FX risk 1/		Interest Rate Risk 1/			Credit Risk		" 10% decrease in the TOT" 2/
	(1)	(2)	(1)	(2)	(3)	(1)	(2)	
Net FX position	30% deprec.	7% aprec.						8.4% depreciation
Value of trading Portfolio Value of Investment Portfolio			Simultaneous Paralell increase in Rates nominal and real domestic rates ↑ 160 bp USD rate ↑ 100 bp	Simultaneous Paralell decrease in Rates nominal and real domestic rates ↓ 160 bp USD rate ↓ 100 bp.	Simultaneous shif increaese in the yield curves Increase to the June 2002 values			s/t nom rate ↑ 180 bp. s/t real rate ↑ 35 bp l/t nom rate ↑ 160 bp. l/t real rate ↑ 11 bp.
Interest Income			Repricing of Assets and Liabilities maturing during the year at new the rates			50 decrease for every 1 percent increase in provisions		Repricing of Assets and Liabilities maturing during the year at new the rates 50 decrease for every 1 percent increase in provisions
Provisioning Expenditures						Maximun annual increase in provisioning rates in the last five years	Corporate customer operating profit ↓ 5% .If new EBIDTA < 1 the loan becomes NPL ad it is provisioned 40%. IF < 0, loan becomes structural NPL additional provision of 40 %	GDP ↓ 1.1 pp. Unemployment ↑ .4 pp. corr. GDP prov. -20% corr. unempl. prov. 40% corr. interest prov. 70% corr. FX prov. 0%
After Shock CAR Individual banks	10.3% - 289%	11.8% - 420%	10.7% - 240%	10.7% - 289%	10.7% - 261%	9.0% - 267%	-0.6% - 63.4%	9.3% - 307%
Banks with CAR								
<8	0	0	0	0	0	0	4	0
<10, >8	0	0	0	0	0	2	1	3
>10	25	25	25	25	25	23	11	22

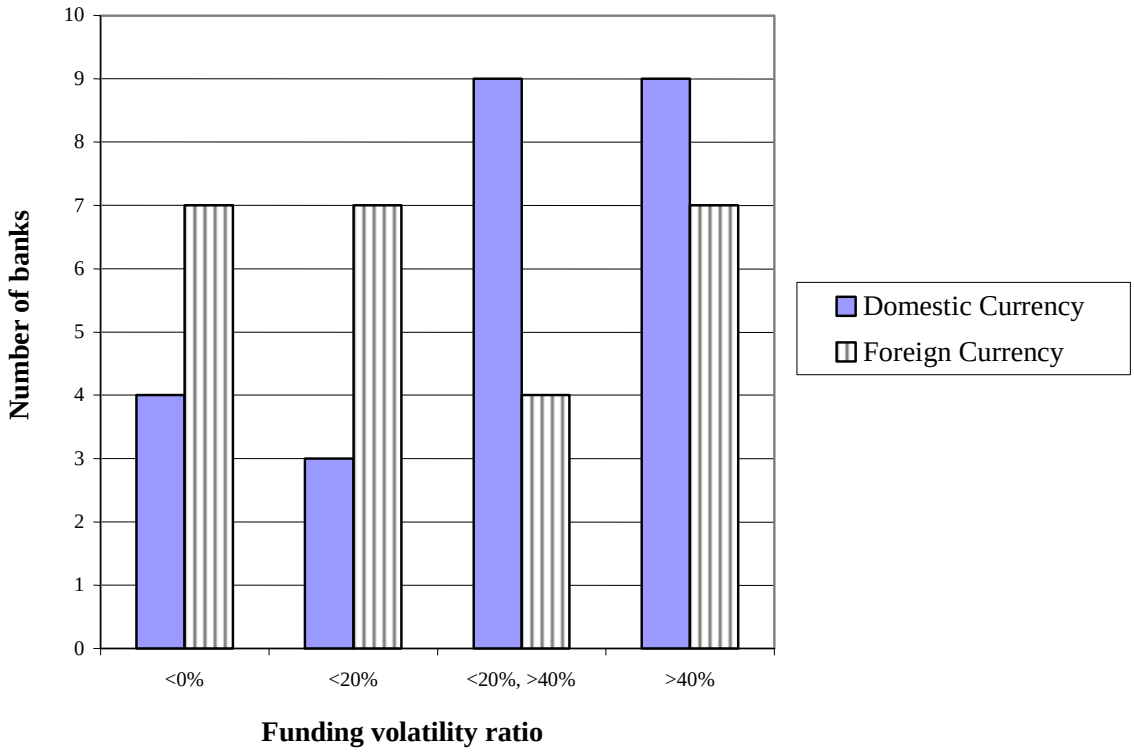
1/ Size of the shocks chosen assuming normality of the distribution of the rate of change, and choosing a 99% confidence interval

2/ Shock to TOT chosen as in footnote 1. Maximun annual decrease observed in the last 5 years was 8 percent .

Size of shocks for other macro variables and correlations with provisioning expenditures estimated by BCCH models

Source: Staff estimates.

Figure 1. Chilean Banks' Financing Structure

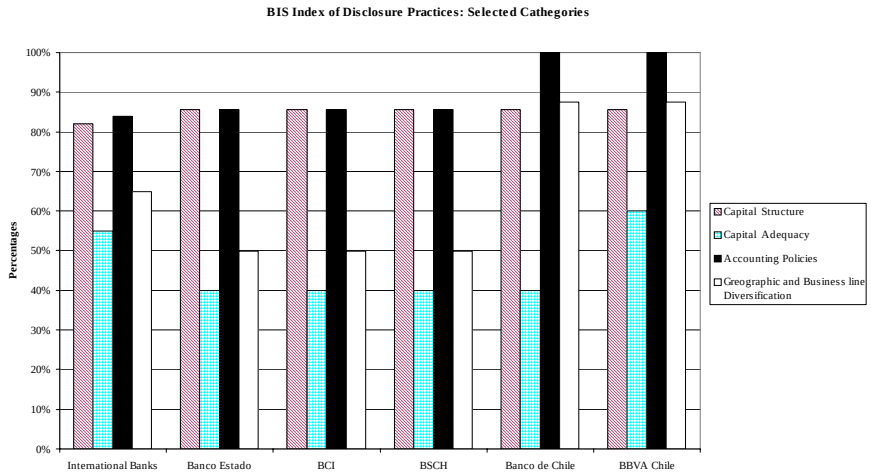


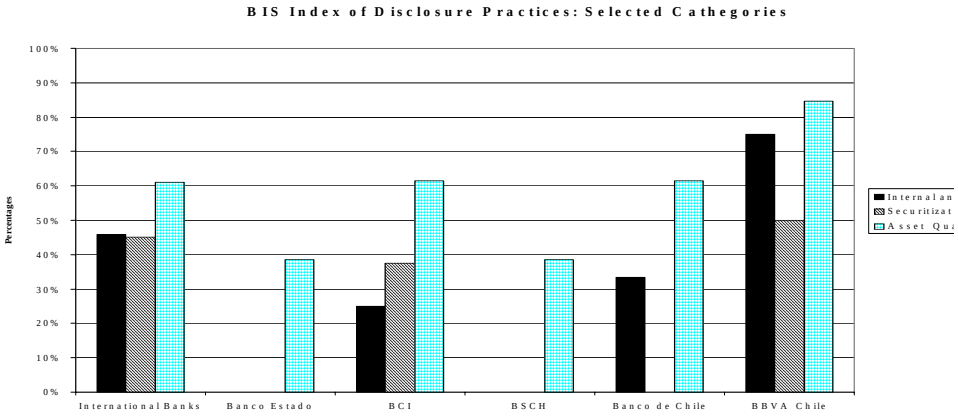
Sources: BIS and staff estimates.

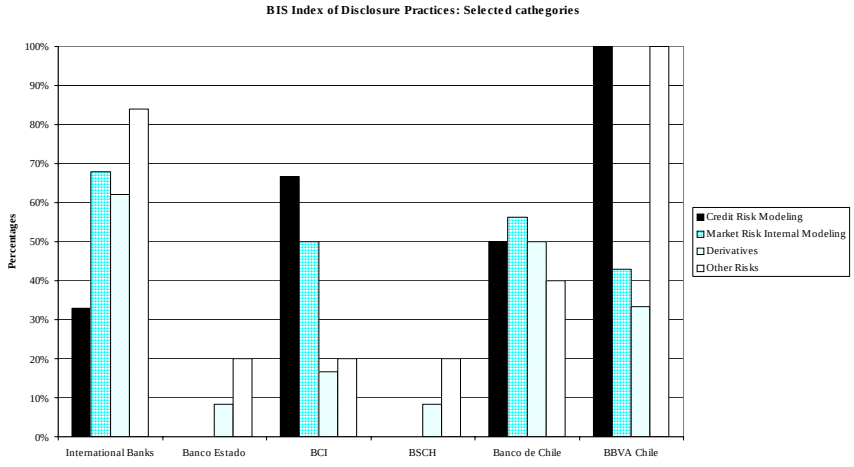
Figure 2. Risk Management Practices by Chilean Banks

Source: Staff survey.

Figure 3. Disclosure Practices by Chilean Banks

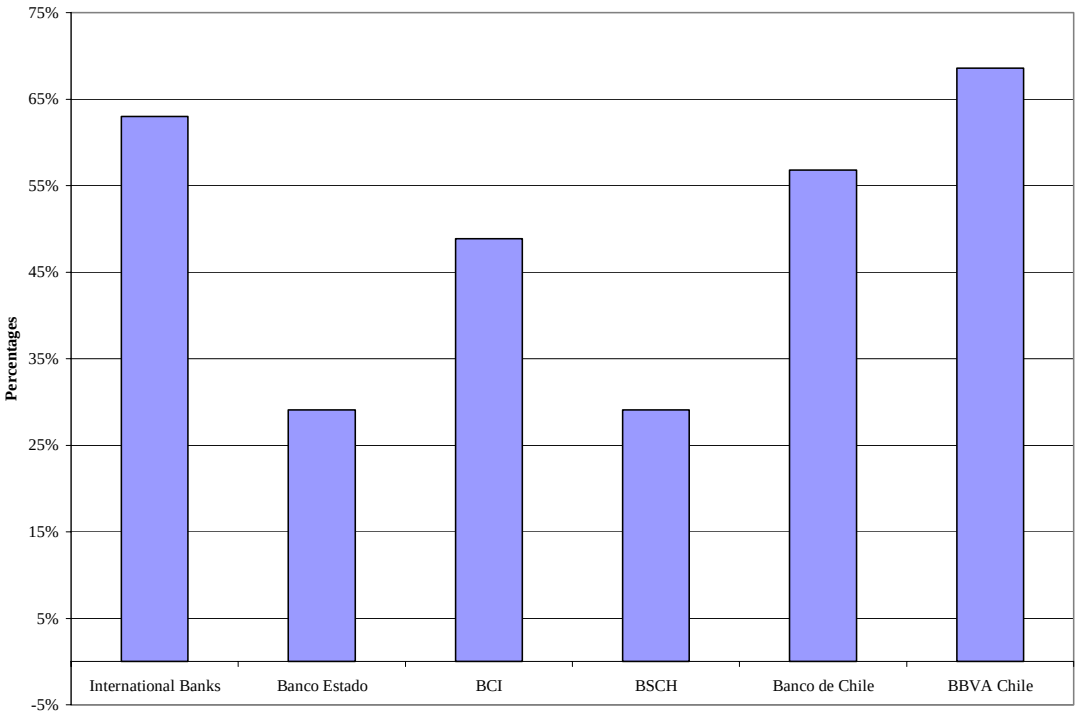






Sources: SBIF and banks' published reports.

Figure 4. Chile: BIS Index of Disclosure Practices



Sources: SBIF and banks' published reports.