

IMPLEMENTING THE VaR REVOLUTION

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1. INTRODUCTION

Almost a decade ago, a major change in the risk-management industry was in its way: J.P. Morgan, the well-known international bank, released to the general public a detailed document describing a simple technique to measure market risks for trading portfolios –Value at Risk (VaR) (J.P. Morgan 1995).

The document soon became an industry standard. Among other qualities, it fully addressed the quantitative recommendations issued by the Group of Thirty (1993), which aimed at strengthening an industry challenged by major financial scandals (Jorion 1997). Most of the financial problems that institutions experienced during these years were related to the lack of appropriate risk-disclosure policies (specially in relation to derivatives), lack of involvement of senior management, and poor internal procedures and risk-management controls.

In January 1996 the Basle Committee of Banking Supervision issued the Market Risk Amendment (BIS 1996), which captured the major concerns of regulators and senior management, by recommending that regulatory capital be assigned according to market risk (in contrast to the 1988 Capital Accord, with a focus on credit risk), and by defining a set of qualitative requirements that incorporate the best practices for risk-management¹.

All banks would be required to allocate capital to prevent balance sheet and off-balance sheet adverse changes caused by unforeseen movements in interest rates and market prices. For larger institutions, it also suggested that capital should be assigned on a regular basis according to the trading portfolio's market risk.

As for best practices, in general terms the Amendment established the need for ongoing improvements in risk control and risk disclosure, focusing on a more technical measurement of market risks (daily mark-to-market of the portfolios and measuring risks through VaR), and stressed the development of a risk-management culture with strong involvement of senior management.

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¹ These best practices were previously discussed among bankers, consultants, supervisors, and practitioners in what was known as the Group of Thirty recommendations: a set of 20 recommendations issued in 1993 for dealers and end-users of derivatives, and 4 recommendations for legislators, supervisors and regulators.

Although the Amendment has not been fully incorporated into Chilean regulation yet, specially in terms of the internal model requirements, many banks have voluntarily adopted VaR calculations and other of the recommended best practices.

This article provides a general overview of the extent to which these ideas have penetrated the Chilean banking industry. In particular, it reports on a survey inquiring about the current level of compliance with the best practices recommended by international regulators and practitioners.

2. RISK-MANAGEMENT AND BEST PRACTICES IN CHILE

In order to measure the level of actual development of the risk-management (henceforth, RM) standards in the local market, we interviewed the 17 largest financial institutions, representing more than 95% of the total assets of the industry, and almost 92% of its capital as of July 2003. Nine institutions were left out: two of them local banks that just started their operations, and seven foreign branches of international banks that have a small-sized operation in the local financial market.

The interviews were conducted between August and September 2003, and tried to identify quantitative and qualitative adherence to RM best practices in the banking industry. The best practices in market-RM were defined by 10 principles, based on the Basle Market Risk Amendment recommendations (BIS 1996)².

Each interview tried to assess the bank's current level of compliance to each of the 10 chosen RM principles. The level of compliance was classified in one of the following categories: (1) There is no compliance to the RM principle; (2) Compliance is insufficient, either because the organization is just starting to address the issue, or because it is not yet a priority; (3) Fair compliance to the principle, but with important issues still pending; (4) The organization is almost complying with the principle, but minor issues are still pending; and (5) Total compliance. Loosely, we can associate a score of 0% to (1), 25% to (2), 50% to (3), 75% to (4), and 100% to (5). The results of the survey are summarized in Table 1 below:

² There is a large literature among practitioners on best practices for RM. See for example Crouhi, Galai and Mark (2001), or Chorofas (1998), or visit www.garp.org, and www.prmia.org for RM professional associations.

TABLE 1
COMPLIANCE TO RM PRINCIPLES

Principle/Category	1	2	3	4	5
	0%	25%	50%	75%	100%
1 Senior management involvement	2	3	7	0	5
2 Seniority and independence	4	4	4	0	5
3 Sound measurement	2	5	3	3	4
4 Daily mark-to-market	0	2	5	0	10
5 VaR limits	0	7	3	5	2
6 Strong team	1	6	5	0	5
7 Stress testing	2	0	6	0	9
8 Backtesting	2	4	0	0	11
9 Independent auditing	0	9	2	0	6
10 Infrastructure	2	5	2	0	8

Principle 1: *Senior management involvement in developing a risk-culture, encouraging the implementation of best practices in RM, and helping in the definition of an appropriate organizational form.*

Only five banks were considered as complying 100% with this principle. The rest were considered halfway or below 50%. Although the majority of them mentioned RM as critical in their mission statement, this was not totally consistent with the amount of time senior management spent in strategic discussions with the head of the RM team, or with the role of senior management in promoting a cultural change in the organization.

On the other hand, the relative relevance of the RM group inside the bank was noticeably different between these five financial institutions and the rest, as measured by seniority of the RM team, office space, and infrastructure, among others.

It is important to notice that the top five banks in senior management involvement, are also the earliest in implementing VaR in their trading portfolios. This suggests a level of maturity of the organization in this area.

Principle 2: *RM head with strong political weight in the organization, independent (specially from the risk-taking group,) and with a clear role in developing and enforcing risk policies.*

We measured the compliance to this best practice, by asking what was the role of the head of the RM team, who were her counterparties inside the organization, how policies were designed and enforced, and how independent the RM group was (specially from the treasury group).

Results turned out to be highly correlated with those of Principle 1: the same five banks that comply 100% with Principle 2 also comply with Principle 1.

The major problem we encountered was the lack of independence between the RM team and the treasury group. Often, the risk-manager depends functionally on the head of the treasury. In other cases, the head of the RM unit is a junior

analyst, or a mid manager. Moreover, the strategic decision maker is often unaware of the technical details, and shares responsibilities with other areas, such as credit risk. In three cases, the RM area had been recently created, and its head was barely starting the process of developing RM policies.

Principle 3: *Sound conceptual risk-measurement system based on VaR, implemented with integrity in the RM group of the bank.*

We asked whether VaR was computed, and if so, what method was used to estimate potential losses. We also asked other technical details such as the confidence interval, the time horizon, the type of statistics, and the number of risk factors being used.

Only two banks recognized that they were not currently performing VaR calculations, and five banks mentioned they were in the process of implementing a new VaR software. These were medium-size institutions or recently created banks. The remaining banks had a VaR calculator, but their sophistication level varied with the size of the bank, and how long had the RM team been developing this measurement.

Most banks were computing parametric VaR, and four of them used historical simulation as well. The number of independent risk factors in use varied from 15 to 120, although the majority used between 50 and 60. Although for a small-size economy like Chile this might seem too large a number, it should be borne in mind that some institutions are using fixed-income instruments as risk factors rather than zero rates because of the lack of interest rate data. Other institutions, with more sophisticated systems, use factors with different credit risk levels, modeling rates and spreads independently. Furthermore, RiskMetrics works with 400 risk factors for global markets.

The sophistication level of the risk-measurement model can still be improved in six institutions, so that it may become an integrated tool for the RM and decision making platforms. In particular, some of these institutions could improve by having a more flexible calculator, while others by standardizing the set of risk reports required by the bank. This is a learning process, where banks need to invest time and resources to make the VaR-calculator development into an efficient risk-communicator.

It is our impression that some banks are lagged in the learning curve, but in general the industry is moving into the right direction, increasing the integration of the VaR calculator with the RM process.

Principle 4: *Daily mark-to-market valuation of the market-risk exposed portfolios, and daily risk measurement.*

This requirement was generally met by most banks that calculate VaR. However, two of them mentioned that their mark-to-market frequency was monthly, while three others defined their risk frequency as monthly. In those cases, we assigned a 50% compliance score.

Currently available banking software in Chile provide the ability to per-

form a daily mark-to-market of the trading portfolio. Hence, banks that are not able to perform this operation are technologically falling behind.

Principle 5: *Risk-measurement model should be used to define limits, allocate capital, and measure performance: risks and returns should be informed together.*

Most banks that used VaR to measure portfolio risks, were also calculating VaR limits (or would do it shortly). However, it was less common to see VaR used in the calculation of performance measurements. This would require a more integrated approach to RM, and therefore seems further ahead in the learning curve.

Two banks declared that they already had, or would implement shortly, risk-adjusted return measurements. These are the banks that have a long history of VaR calculation, and furthermore have a very strong RM organization. Seven banks had a trading limit established with a system different from VaR, or were in the process of developing it. The trading limit was more often based on stop-losses and sensitivities to particular scenarios (typically term structure perturbations). The other ten banks computed VaR limits, but three of them had no particular plan regarding performance measurements. Five other banks mentioned that they would include risk-adjusted profitability parameters in their reporting in the future.

Overall, we see that half of this recommendation was applied: VaR limits existed or would be implemented soon. However, the majority of the banks still did not use the risk figures for capital allocation purposes.

Principle 6: *Strong RM group, regularly updated in their knowledge basis.*

To assess the degree to which this recommendation was put into practice, we asked risk managers about their professional background, and about training courses taken by their staff. We also asked for specialized magazines or web page subscriptions. The discussion on technical issues also allowed us to ascertain, at a qualitative level, their technical ability, and we proceeded to rank banks accordingly.

Only at five banks we were able to discuss issues such as potential improvements to their current parametric model, to capture all the subtleties of the Chilean yield curves, or how to incorporate inflation risk in an explicit manner. These five banks are the same where we saw a strong top management commitment. In seven other banks the level of understanding of the technical team was still insufficient. These persons were just being trained in VaR methods, or were considering to do so in the near future. The remaining banks had a fair understanding of the technical issues involved in VaR calculations, but were not investing in expanding their knowledge base. For instance, only four of the seventeen banks of our sample were subscribed to some technical publication on the subject.

This phenomenon seems to follow the same pattern emphasized before: for some banks –those with a large size and an important level of business–, it pays off to transform the RM team into an investment that could even play an important role in quantitative analysis: for example, developing more sophisticated pricing techniques for the trading floor, or internal models for credit risk measurement. In a sense some banks can afford to transform this “cost center” into a profit center. Smaller or lagging institutions are not investing enough in a strong quantitative group, or are not training their personnel beyond what is strictly necessary to comply with regulations.

Principle 7: *Banks must conduct periodic stress tests of their portfolios.*

We asked whether stress analysis was performed, and under what methods. We found that almost all banks perform some form of stress analysis, although in the case of foreign banks, this was the consequence of head office requirements. In other words, the *art* of creating stress scenarios was somehow delegated to the international experts, although this also involves an opportunity to dialogue and discuss about the relevant scenarios to be considered for the local markets.

Six banks had a very simple stress test analysis, primarily based on repeating some historical or predefined scenario. The remaining banks were more sophisticated, spending more energy in the creation of correlated scenarios for some variables.

In general terms, most banks that calculate VaR use some level of stress testing, and the adequacy to this principle seems appropriate for the level of complexity of their portfolios.

Principle 8: *Banks must conduct periodic backtesting procedures.*

Backtesting is necessary for the analyst to check the accuracy of the statistical estimate for VaR. Almost all banks that are calculating VaR are either performing backtesting, or about to implement it. As in the stress test case, most banks comply.

Principle 9: *Independent review of the RM and measurement processes.*

When asked about these audits, most foreign banks had a strong control on the procedures and calculations performed for RM purposes. However, local banks –with the exception of two that had once a specific auditing process–, did not face a formal review of the measurements other than the regulator’s. Often local banks validated their methodologies internally, without an independent opinion. Others found it reassuring that calculations were provided and tested by software vendors.

Most banks were audited internally in their processes. However, it was difficult to find a more specific RM functional auditing procedure. The revision of risk measurements has been provided by software vendors and private consultants, but not in a systematic manner by external, specialized, risk-auditing firms.

Principle 10: *Adequate RM infrastructure of independent and accurate data, and integrated technology.*

We focused on the procedure in use to perform calculations: Whether it was an internal or external software, or whether it was done in spreadsheets. The lack of good data was a problem faced by all market participants, so we excluded it from the scores.

Seven banks did not have an adequate technology, although three of them were at that point switching from spreadsheets to an external system. Two other banks had developed internally systems that did not have the necessary flexibility or performance, and were evaluating a change. The remaining banks had systems with an adequate level of integration and consistency with the rest of the technological platform, either developed internally or bought from third parties.

3. CONCLUSIONS

The survey conducted in mid 2003, reveals that after more than 7 years from the date of the Market Risk Amendment publication, the Chilean Banking industry is on average complying with 60% of the best practice recommendations.

The lowest compliance is found in Principles 2, 3 and 5, with an average score of 51%. This reveals that the major weakness is the lack of independence and a weak political RM organization. At the same time, although VaR is computed in most banks, the average technical teams is still lagging on the learning curve. Finally, RM is not yet used in the capital allocation decisions. This state of affairs is probably the consequence of the recent adoption of VaR techniques. Most banks declared that they had incorporated the VaR measurement three or less years ago.

On the other side, the areas that seem to be adequately covered are 4, 7 and 8. That is, the technical basic aspects of the methodology are covered, in part due to the fact that the local banking superintendence has been very keen on requiring daily mark-to-market, backtesting, and stress testing. Most of the banks that do not present a good score in these areas are in the process of implementing a solution.

Among banks, however, the progress seems fairly unequal: although the top five institutions have a degree of compliance of 94%, the five worst score 28%. Moreover, the lagged banks are typically the smallest.

The major challenge in the Chilean banking industry seems to occur at the organizational—rather than technical—level. We conclude that specially for mid-size and small local banks, RM teams require to be empowered to make important contributions at a strategic level. Nevertheless, more technical issues such as inflation risks, modeling of liquidity risks, creative generation of zero curves, treatment of mortgage bond options, are being discussed by very few local experts. These issues are treated either internally in the top banks, or in conjunction with software vendors, but usually without a dialogue between practitioners.

Lack of quality data, specially regarding interest rates, has been an important challenge to build stronger expertise on risk analysis. At the same time we have the strong impression that a fruitful dialogue among practitioners could be an important step forward into the organizational and technical development of the RM organizations.

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