

Risk Management in a Transition Economy: The Chilean Case

Abstract:

Over the few last decades, the Chilean economy has grown at a high rate, allowing the GDP per capita to move from USD 10,700 to USD 19,887, and the capital market size to grow more than 16% during the same period. Given this, it is expected that Chile will be considered a developed country the next few years. In addition to this growth, Chile is in the development of joining the Organisation for Economic Co-operation and Development (OECD); a development that is expected to accelerate positive changes in the economy. However, within recent years, Chilean firms and the capital market have been facing several financial scandals within almost all economic sectors causing several changes in the regulatory market structures and environmental legislation. These scandals have consistently occurred in big companies with strong risk management procedures; however these control mechanisms have not been successful due to misinformation or information manipulation. The changes faced by the Chilean economy can be considered as operational risk. These risks result from inadequate or failed internal processes or people systems, or from external events. The radical changes in this transitional economy and the impact within different companies are good examples of warnings for emerging market economies trying to implement risk management control systems. Unfortunately, changes in the scope of the internal revenue system and market regulatory agencies, such as in the United States SEC and the costumers' association, are ones that cannot be modeled in the traditional sense. Where the Matis (2009) simplified operational risk management, it is not feasible based on identification, evaluation, monitoring and management.

Keywords: Risk Management, Emerging Markets, Value at Risk.

I. Introduction

Risk management in emerging markets is a powerful idea among large companies, but the international standards are not always useful in these economies. Additionally, these economies are different from developed ones in many ways at the macroeconomic and microeconomic levels, so new and different risks must be factored in. At the macroeconomic level, we can identify the following risks: social, political, exchange rate, environmental regulatory, and physical.

Physical risk is based on the fact that all countries differ in size, location, and physical attributes. The most obvious physical risk is climate. Each country has a particular climate that impacts the global risk of corporations. This can have major effects on an economy since, often in emerging economies; there is not an emergency government agency to help in extreme situation such as climate. For instance, in Chile, the number of aircrafts fighting forest fires is minimal in relation to the size of the forest industry and flammable materials used in older building. In a majority of emerging markets, the mining industry is relevant to economic success, but climate changes and the excessive water usage by the industry can cause major impacts on risk management when rainfall is less than expected. Natural disasters are a common risk in emerging markets. Especially in Chile, earthquakes, floods, and wildfires occur every year, and the impact of these phenomena cannot be diminished or prevented since governments in emerging markets are not sufficiently equipped with resources to protect either their people or businesses.

Just as in real estate, location is also pertinent regarding risk management in emerging markets because these countries face transportation and diplomatic risks when goods cross from bordering countries. For instance, in Chile's exports-oriented economy, every summer season, fruit exporters face the risk that port unions will block the ports. In addition, shipping vessels carrying vehicles often have to wait days or even weeks to unload their products, costing potential losses of reputation and money for clients. Utility risk is faced by

corporations in emerging markets due to underinvestment or lack of regulation within utility firms. This could mean high costs or restrictions of public services such as electricity or water. Chile has a protective law that favors power producing firms, so the power costs have been growing at a rate higher than productivity in almost all industries. These growing prices have been damaging the Chilean economy in terms of productivity and comparative advantage to other emerging countries.

Of course these natural risks can be faced by corporations in developed countries, but in emerging markets, the risk faced is much more critical. Thus, it is imperative that these risks be taken into consideration by the higher levels of management teams within companies in emerging markets.

Social risk is an important source of instability in corporations located in emerging markets, but this risk is latent since it can show up at any moment even when it is controlled or accounted for. Primarily, social risk is associated with tribal divisions, especially after the Indigenous and Tribal Peoples Convention in 1989 (ILO-convention 169 or C169) where the need to protect these cultures' resources, beliefs, and way of life was established. More than that, faster methods of communication and a higher degree of readily available knowledge imply a risk of a tougher social oversight to corporations. This social risk can be catalyzed by changes in law, regulation, and perception of a company and their executives. Also included in social risk is included religion risk, since faith can be a powerful social divide in some countries or regions.

Population risk, a major concept of risk management, includes birth rate, rural versus urban population distribution, education level, mobility of the work force, and the workforce's ability to be trained in different industries. Human capital is a key for corporations. Within the mining industries in Chile, the demand for workers is so high that companies have been known to train entire households and encourage migration from the south of Chile to the

north, generating scarcity of labor for the southern agricultural sector. The mining industry in Chile offers perks such as indoor training facilities for different levels of its workforce and ambitious plans to retain them. Furthermore, the health system and the health of the population itself are relevant risks for corporations; a good example is the Ebola outbreak in Africa; a pandemic such as this increases the risk of any operation within the zone and proximity. A measure taken to decrease the health risk among the population working in the agricultural industries in Chile included the standard for sun protection and personal hygiene. Economic risk is based on the fundamentals of the economy related to state control and intervention. Even though in previous years there has been a tendency for governments in emerging markets to privatize firms, recently it has been shown now there is a slight tendency to renationalize key industries. One case that caused a considerable amount of commotion was YPF versus Repsol. In this case, the Argentine government nationalized YPF from Repsol, a Spanish company. This case is an example that economic risks often not only cause debate on the economic level but political as well. Also, the protections that can be imposed by a president in an emerging market are a source of economic risk for corporations because these protections can be accompanied by price fixing or managing prices from within the government. The best example of this is when the Argentinian President, Cristina Fernández, ordered supermarkets to freeze prices for one to three months on a basic basket of goods in order to reduce inflation. Another source of economic risk is located in Santiago, the capital of Chile. Here, public transportation is privately owned, but the ticket price is regulated by a government agency in order to subsidize protection for vulnerable people using the public transportation system.

Sometimes government decisions are keys for corporations specially related to infrastructure investment. Typically, infrastructure investments are focused in large cities, but direct foreign investments are oriented to businesses outside of urban areas; however, some promises by the

government to invest in certain regions or zones are not fulfilled quickly. Such risks go hand in hand with the income distribution and the tax structure of a country. Therefore, it is expected to have high economic and social risk if the income distribution is unfair. This means the country's financial stability is a source of risk, so if a country has a constant deterioration of its macroeconomic accounts, it will clearly be a source of risk for all companies located in the country. In addition to these risks, one must consider that actions taken by politicians facing a deteriorating economy often make desperate decisions- creating even further risk for the economy and companies.

Another macroeconomic risk for corporations is a thin financial market so banks have monopolistic power in lending money that allows them to subtract consumer surpluses by issuing high interest rates and covenants. With a monopolistic power on the lender side, financial stability is a requirement for corporations facing higher costs of carrying a larger working capital and liquidity costs. In addition, it is important to consider the main characteristics of the capital market: its liquidity, depthless, self-regulation, transparency, accounting standards, and the reputation of the regulatory agents in each economy. Within the last year in Chile, several scandals proved that the capital market and the regulatory agents were not doing their jobs. Although the Chilean capital market was reputable, managers' poor decisions betrayed investors and the general public. This in turn caused firms to face a high risk in transparency and credibility from the market and people. Often, these problems in the capital market can be observed in the volatility of the stock index or stock volatility, but if there is low liquidity and a concentrated market, the volatility does not reflect the actual risk of a particular market.

After the great recession in the US, Europe, and the low growth in China, money flowing to emerging markets as direct foreign investments and portfolio investments gained high returns with low risk. However, as soon as commodity prices returned to the historical levels,

international capital flowed out from emerging markets. Now those countries are facing Balance of Payment issues with high exchange and interest rates and lower asset prices. Under these conditions, the political risk increases in emerging markets regardless of political leader's experience. Remember, "Power corrupts but absolute power corrupts absolutely." The concept of the Power Base in political risk is relevant since some form of a democratic election processes now operate in more countries across the globe. However, with this, the disadvantages may include lack of funding, lack of access to the media, and the arrest and imprisonment of leaders. Other forms more democratic but limiting the leadership renovation is called bi-partisanship, in which only two political groups are in power. During economic downturns in emerging markets, presidents can make extreme decisions to regulate prices, markets, and exchange rate. For instance, in Argentina, President Cristina Fernandez froze food prices and services to fight inflation, generating scarcity and not investment in services such as electricity and drinking water. Another risk in emerging markets is patronage and cronyism, where multinational corporations are forced to nominate members of board directors who have relationships with the ruling political party or former state secretary. In addition, top manager positions are often reserved for local politicians, and partnerships are formed with local companies that are well connected in economic and political terms. In emerging markets, the concentration of political and economic powers is significant.

Under political risk, we can also find the legal and regulatory framework; this is significant in transitional economies where new laws and regulations demanded by citizens and politicians mean that companies must comply in order to move forward with operations. In fact, economies in transition will raise their pollution and homeland security standards in order to fit within OECD¹ standards. This includes changes in workers unionization, transparency, tax levels, government deficits, quality of air and water, quality and level of education within the

¹ Organisation for Economic Co-operation and Development.

population, etc. Also affecting political risk is corruption and lack of transparency. Corruption scandals are more frequent in emerging markets, so it is a risk faced by corporations within these markets. The final contribution in political risk is both internal and external “conflicts” in a country; for example, the conflict of regarding students in Chile in 2007, where thousands of high school and college students marched, calling for improvements in education and an end to education for profit. This changed the reality of private education and transformed it into a nonprofit sector. During this conflict, international firms with universities in Chile had a significant increase in their risk levels.

II. Literature Review

At the microeconomic risk level, management firms can face the difficult task of identifying sources of risks, such as:

i. Financial risk

Capital markets are different in emerging markets than in developed ones because they are more volatile, segmented, and unpredictable, and thus, companies are financially vulnerable. Regarding access to credit, a large number of corporations in emerging markets are part of a holding in which a bank finances the rest of the corporations or there is an implicit agreement with another bank to finance each other’s firms. In corporations that belong to a financial holding, present lack of transparency and limited disclosure present accounting risks. Banks have the power to hold discretion in credit analyses. Recently, for example, a Chilean bank granted credit for USD 10 million to a small firm with equity of USD 9,000. The regulatory Chilean banking agency approved the loan because the company belonged to the daughter-in-law of the recently elected president, and the credit was authorized by the owner of the bank.

In an emerging market, exchange rates and interest rates move dramatically and unexpectedly. For instance, in Argentina two exchange rates co-exist: the official rate and black market one –or “blue dollar”– with a difference up to 75% black market over the regulated one. However, here, the primary issue is that the capital outflow controls make it almost impossible to send money from Argentina to abroad.

The concept of liquidity in risk management in emerging markets is different than the one in developed economies since it is related to the availability of dollars and the local currency in the spot and future markets. The main concern in this case is that liquidity is highly volatile, affecting both the exchange rate and the interest rate. This means the central bank and banking system play an important role. In a Chilean case, an investment bank firm went bankrupt unexpectedly, and the Chilean Central Bank intervened by injecting liquidity into the system and using the state commercial bank called “Banco del Estado” to buy CDs from other banks to maintain liquidity in the system.

ii. Operational risk

In emerging markets, staff culture, work ethic, and time keeping vary and may be volatile. Willingness to strike or Lay down tools on short notice and for minor issues or nationalist sentiment could be a source of risk, especially in isolated areas. For example, in Chile, in the northern port of Puerto Angamos, the workers asked for a lunch hour in their workday or the equivalent in monetary compensation. These were per day workers with no contracts. This strike occurred during the fruit season and lasted for 21 days, costing USD 210 million per day. It is never a good idea to underestimate the power of the union and semi union organizations. In the Chilean mining industry, a shortage of skilled local managers and specialized workers make it vulnerable to poaching by competitors. Therefore, companies have developed different strategies to retain talented workers such as a continuing education program for all of their workers.

iii. Technology risk

Technology risk is not a trivial one in emerging markets since there are restrictions to importing hardware, exchange risks, incompatibility in communication systems, vulnerability of the communication systems, and scarce availability of power and access to technical support. For instance, in southern South America, internet service is different than in the North America, so those southern nations are working together towards better Internet connectivity with more data capacity and high speeds. Getting these nations to work together is difficult but worth it overcoming the technological risks.

iv. Outsourcing as management risk in emerging markets

In emerging markets, firms in the raw material industry use outsourcing to control fixed costs and gain flexibility, but if contracts have little meaning, this may increase risk considerably. Service standards are frequently not met and post-contractual opportunistic behavior occurs if there is limited back up. Within outsourcing, fraud heightens vulnerability and occurs when management has limited understanding of local practices, staffs collude, or political favors are bought. Also, Multinational Corporations (MNC) must pay attention to cultural blindness to fraud, or the attitude that stealing from wealthier countries is acceptable. This mindset and fraud can be brought about due to scarce resources in utility within the emerging markets. Most of the time, transportation unions are strong in emerging markets with high bargaining power. Physical security may be a problem for plants, personnel, and processes. For instance, in Chile the demand for security in the mining industry was so strong that MNC were recruiting people from the army and the police force; taking advantage of their training. In response to this, the government was forced increase salaries in the police and army forces. Foreign executives need to be adapted to local conditions including procedures compliance with local regulations. For example, if the workers are paid on Friday, on Monday the company will see a high number of absences. Also, with political change and new social needs, change may come quickly and suddenly.

v. **Environmental risk**

Environmental risk is also faced by MNC investing in emerging markets. However, the primary concern here is the changes in regulations and the rule 169. Due to these concerns, low standards or non-enforcement may reduce environmental risk, but this risk is changing and poor practices today may be problems in the near future. In Chile, in a small region called Caimanes, there is a big controversy among the inhabitants and mining of Los Pelambres, the Luksic Group. In reaction to this controversy, the firm has had significant costs since 2002. Uncertainty arises from the potential impact that political events could have on the environment, so changes in confidence in outside investors could be affected. Such is the case of Pascua Lama, a mining company divided between Argentina and Chile with different environmental restrictions. This project has been stopped for months time and time again until environmental resolutions were authorized by Argentina, Chile, or both. It becomes even more difficult to see where risks are originating from due to the structural changes about to start, started but not finished, started and abandoned, or completed but not working.

III. Research Problem and Objective

Risk Management in emerging markets is a powerful idea among large companies, but the international standards are not always useful in these economies. Specifically, the *Value at Risk (VaR)* may underestimate the risk associated with investments in emerging markets, where new events show up unexpectedly changing the level of risk in a given company. The objective of this study is to show that the Risk Management procedures can fail in an emerging market economy due to misinformation or information manipulation and that the observed loss can be greater than the loss estimated by *VaR*. For this, five cases from Chilean firms whose shares experienced significant increases in volatility were analyzed: Schwager, La Polar, Hites, CSVA and Soquimich. The radical changes in this transitional economy and

the impact within different companies can be good examples of warnings for emerging market economies trying to implement risk management control systems.

IV. Methodology

Emerging markets present a special case for the design and implementation of risk management systems. In particular, the Chilean economy, a leading country in Latin America, is facing a transition between its emerging and developed economy. With important structural changes in the regulatory business environment and significant changes in its society, citizens are demanding their rights and social control. The Chilean economy has been growing at a high rate during the last ten years, and the subprime crisis has had a minimal effect thanks to fiscal responsibility, the high copper price, and a strong inflow of international capital in both direct and indirect investments. However, the typical management risks still remain: team, inflationary, exchange rate, copper price, and interest rate among others are not bullet proof in this transitional economy.

Although large firms in Chile have been taking care of risk management with the help of their size in a highly concentrated market, we can find five cases in which risk management in these companies was not properly evaluated for they top executives or they were too good to cheat the market and all the regulatory agencies in the Chilean Capital Market. In these cases, control changes made by the regulatory agency played a significant role with the people organizations. These cases can be identified as: Schwager S.A. (2004), La Polar S.A. (2011), Hites S.A. (2011), CSVA S.A. (2011) and Soquimich (2015).

i. Schwager S.A.

Schwager is a coalfield that has used false information and data to multiply its stock price on several accounts. On September 16, 2004, Schwager stated that its Board had agreed to hire the consultant Poch Ambiental S.A. to assess three projects for the firm to enter the emerging market of carbon bonds: (1) a forestation of large areas of desert and semi-desert

land, (2) development of a fuel additive to reduce polluting effects, and (3) treatment of liquid waste for fishing in the Arauco Gulf. Schwager's announcement circulated in various media about its new business and a seasoned equity issue. Consequently, its share price increased by 328%, from about CLP 2 to CLP 7.7 (Figueroa, 2012).

The newspaper, *Strategy*, highlights an interview on October 1, 2004 of Schwager's CEO, in which it was stated that the share price would be around CLP 100 per share and that the company was very far along in projects to reduce emissions. On this date, the share price reached CLP 40. In other words, the news published coincided with a rise in price of 419%. In addition, on June 29, 2005 Schwager signed an agreement with Empresa Nacional de Petroleo (ENAP) to develop a joint project on the fuel additive "Chiss." They agreed on a business plan for national and international means (Rosenblut, 2011). On June 30, using a "Plug Material Event," Schwager sent the text of the agreement and the offer letter referring to the price of the additive Chiss for future trades. After the announcement of the agreement and its supplementary information, the stock price increased by 146%, from an average price of CLP 8.2 in the previous two months to an average price of CLP 20.63 in two months following (Rosenblut, 2011). However, on August 12, 2005, Schwager unilaterally terminated the agreement with ENAP, a fact that was reported to the market only on November 8, 2005. The same day, the SVS published the terms of the agreement and the stock price recorded a fall of 23.8% compared to the previous day's close. Schwager is a case of stock price manipulation which involves the public spreading false information (Ullah et al., 2014). The ruling in the case Schwager is termed "Pump and Dump" (Rosenblut, 2011).

ii. La Polar S.A.

The second case is La Polar S.A., a department store company focused on middle and low-income families. Here the firm lost more than USD 1 billion of its equity in bad credits, but hid losses for a considerable amount of time through earnings management practices on the rollover of bad loans. The event took place on Thursday, June 9, 2011, when the La Polar

stock price collapsed. On Wednesday, June 8, its closing price was CLP 2,336.2 and the next day it was CLP 1,352.2, posting a loss of 42.1% of its market value in just one day. The fall in the market price came after the company reported unauthorized practices in the management of the loan portfolio and far from the criteria and parameters established by the company. Additionally, such practices (called "unilateral renegotiations") could raise provisions for loans with loan losses between 150 billion and 200 billion Chilean pesos (SVS, 2011a), almost 10 times the provisions made in 2010 and totaling 22 billion Chilean pesos.

The system of unilateral renegotiation involved the company automatically rolling over bad loans but with a high interest rate of about 200% in annual terms (Traslaviña, 2013). Usually, the operation consisted of granting a new loan in which all the original debt including interest and renegotiation fees were located on a single ballot with a payment period of 36 months. This new ballot was mailed to the debtor. The original debt had doubled or tripled with the new ballot, but it was a unilateral change (Traslaviña, 2013). A newspaper article on Friday, June 10 was entitled, "The Polar loses 42% of its Value in One Day by Financial Scandal".

iii. Hites S.A.

What happened to La Polar caused a negative reaction on the stock price of another department store in Chile, Hites. This was due to the market suspecting similar, widespread practices in the retail sector. While there was no evidence that Hites practiced a system of unilateral renegotiations, its business model was similar to La Polar's, so La Polar's negative reputation spread to Hites. An analysis of abnormal returns concludes that the market significantly punished the share price of other retail firms in Chile by assuming that they also took part in unilateral renegotiations not surveyed in financial statements. However, Hites was the most affected. According to the results, Hites recorded significant negative cumulative abnormal returns in the following 5 (between -17.44% and -28.72%) and 10 days (between -24.63% and -34.34%) up to June, 9th, 2011 (Cornejo & Arias, 2014).

iv. South American Steamship Company S.A. (CSAV)

Founded in 1872, CSAV was Latin America's largest shipping company and ranked among the 20 largest shipping companies in the world. In 2009, the subprime crisis negatively impacted global trade, affecting the shipping industry. In 2010, a recovery in transported volumes and freight rates took place. However, in 2011 the maritime containers sector was negatively affected by imbalances between supply and demand, represented by a glut in transport capacity and declines in freight rates in most markets. Moreover, oil prices, which accounted for about a third of the maritime containers sector operating costs, had experienced a steady increase over the previous 12 years. All this had a severe financial impact on shipping companies. To combat this unfavorable scenario, the companies took a series of measures such as closing routes, increasing detainment of fleets, the use of slow steaming, increasing joint operations, and changing the strategic focus of the leading companies in the industry from market share to return. In this context, since late 2010, these negative developments in the container business reduced operational flexibility, a product of the low percentage of owned ships over rented ones versus. The industry and falling margin in CSVA caused a loss of USD 1,250 million in 2011. Consequently, after the Luksic Group acquired CSAV on Friday, September 2, 2011, the CSVA reported a restructuring plan consisting of inter alia, seasoned equity offerings, and a split in the company: South American Steamship Company (CSAV), in charge of the business of container ships; and American, Air, and Maritime Agencies S.A. (SM-SAAM), responsible for providing port services and land logistics in different American ports (SVS, 2011b).

v. Soquimich S.A.

The last case, "Soquimich", is by far the most important one since it had multiple firm involved. The largest of them, Soquimich S.A., publicly traded in Chile and the US through American Depositary Receipt (ADRs). On Wednesday, March 18, 2015 the press published the announcement of the resignation of three directors: Vice Presidents Wayne Brownlee,

José María Eyzaguirre, and Alejandro Montero. These directors were elected by Canada's Potash Corporation of Saskatchewan (PCS), which holds 32% ownership. The news caused a fall of 12.46% in the stock price. Therefore, the Santiago Stock Exchange temporarily suspended transactions of Soquimich stocks. For this case, Parisi and Nail (2015) found the use of pyramidal ownership tunneling to related-party transactions, which move funds from a lower-level firm to a higher-level firm in the pyramidal chain to expropriate minority wealth. This can be considered as another risk for this company faced by small investors.

The resignation of the three directors took place in the context of the financial scandal involving Soquimich, one of the most important non-metal mines in the world. The firm is being investigated for alleged tax offenses associated with illegal campaign financing via false invoices. These are crimes that could extend influence peddling and bribery. At a special meeting on Monday, March 16, the board of Soquimich fired its CEO, who had refused to hand over accounting information requested by prosecutors investigating the alleged crime.

First, for each company, the date of the event is identified. Table I shows the dates and events of study for “Schwager2, “La Polar”, “Hites”, “CSAV” and “Soquimich”.

Table I

Event day for: Schwager S.A., La Polar S.A., Hites S.A., CSAV S.A. and Soquimich S.A.

Firm	Event day	Event
Schwager S.A.	11/08/2005	It is reported that Schwager unilaterally ended the agreement with ENAP.
La Polar S.A.	06/09/2011	The company reports on the roll over loans and new provisions for bad loans.
Hites S.A.	06/09/2011	La Polar reports on the roll over loans and new provisions for bad loans.
South American Steamship Company (CSVA)	09/02/2011	The company announces a restructuring given the new market conditions.
Soquimich S.A.	03/18/2015	The resignation of three directors, who disagreed with not cooperating with the investigation for alleged tax

From the date of the event, a window of 52 weeks is built to study trends and volatility in the stock market. Then, for each stock, variance and standard deviation of daily returns over the last 52 weeks (i.e., within the last year) are calculated. Using the same window, the historical daily average return is also calculated. Thus, two statistics describe the behavior of the return of a stock during the last 52 weeks: a measure of average daily return (mean) and a measure of the volatility of daily returns relative to its average value (variance and standard deviation). The result is the basis for a media analysis-variance according to the theory of portfolios (Markowitz, 1952).

Third, in the context of Risk Management, the potential loss for each share is estimated by calculating the *Value at Risk* (*VaR*), which in 1993 was established as an important measure of risk with a widely accepted use (Hull, 2007). The *VaR* of a portfolio investment is usually defined as the maximum expected loss (resulting from an adverse market movement) with a given confidence level for certain time in the future (Lore & Borodovsky, 2000) and is an attractive measure of risk because it is easy to understand. According to Hull (2007), where *VaR* is used, the goal is to make a statement as follows: it has an “*X*” percent certainty that you will lose no more than “*V*” dollars in the next “*n*” days. The *VaR* is based on the assumption of normality of returns, and its calculation requires knowledge of the relevant standard deviation. The *VaR* for each individual asset was calculated as follows:

In a first approximation, the *VaR* is estimated for an individual asset *j* (*VaR_j*), considering a single risk factor, using equation (1).

$$VaR_j = S_j \times z \times \sigma_{P,j} \times \sqrt{t} \quad (1)$$

This is a standard way to calculate *VaR*. In (1): *S_j* is the spot price of the asset *j*; *z* is the critical value of a normal distribution for a given confidence level; *σ_{P,j}* is the volatility of the price of the asset *j*; *t* is the period of maintenance of assets and during which time one is exposed to adverse market movements that can cause losses.

In a second approach, the VaR is estimated for an individual asset j from the difference between the average daily return (\bar{R}_j) and the estimated minimum daily return (R_j^{Min}), for a confidence level and a maintenance period of the asset, according to equations (2) and (3). To obtain the confidence level, we calculate the estimated VaR_j as the lower limit of a confidence interval of 95% for the daily asset return.

$$R_j^{Min} = \bar{R}_j - z \times \left(\frac{\sigma_j}{\sqrt{n}} \right) \quad (2)$$

In (2): R_j^{Min} is estimated for the asset j minimum daily return; \bar{R}_j is the average daily return of asset j ; z is the critical value of a normal distribution for a given confidence level; σ_j is the standard deviation of daily returns of the asset j ; and n is the sample size of observations (here, the amount of daily returns).

Then the formula (3) estimates the VaR for individual asset j from the difference between the average daily return (\bar{R}_j) and the estimated minimum daily return (R_j^{Min}). The difference between \bar{R}_j and R_j^{Min} indicate the investor's exposure loss. This difference is multiplied by the square root of time (t) to maintain asset j (time during which one is exposed to adverse market movement).

$$VaR_j = (\bar{R}_j - R_j^{Min}) \times \sqrt{t} \quad (3)$$

Then VaR_j is estimated from the average daily return (\bar{R}_j) and the standard deviation of daily returns (σ_j), where both statistics are calculated based on historical returns. In this context, it is assumed that the historical average return is a good proxy expected return and that the historical volatility of returns is representative of its future volatility. According to the definition of VaR , one must choose a value for the two parameters in the definition: the level of confidence (of which the value of z is clear) and the maintenance period of the asset (t), where the level of confidence will be a data provided by senior management or the market regulator.

V. Results

The results for the five cases studied are presented in Tables II and III. Table II shows the estimated VaR for one day, in percentage terms (%) –according to the equations (2) and (3)– and in Chilean pesos (CLP) –according to the equation (1)–.

Table II

Daily VaR results.

Shown below are the estimated VaR for a day and the observed losses at the event. Results are expressed in returns (%) and Chilean pesos (CLP), for Schwager S.A., La Polar S.A., Hites S.A., CSAV S.A. and Soquimich S.A.

	Schwager	La Polar	Hites	CSVA	Soquimich⁴
Daily Return	0.52%	-0.01%	0.34%	-0.34%	0.01%
σ daily ¹	6.22%	1.75%	2.19%	3.29%	1.89%
n ¹	214	251	251	251	247
R_j^{Min}	-0.31%	-0.23%	0.07%	-0.75	-0.22%
VaR in a day (%) ²	-0.83%	-0.22%	-0.27%	-0.41%	-0.24%
Loss (%)	-23.08%	-42.12%	-4.93%	-15.89%	-17.05%
VaR in a day (CLP) ³	-1.20	-76	-26	-13	525
Loss (CLP)	-2.27	-932.64	-29.97	-32.94	2,416.00

(¹): Corresponds to 12 months before the event; (²): Estimated using equations (2) and (3); (³): Estimated using equation (1). The spot price (S_t) corresponds to the closing price of the day before the event, it is considered a confidence level of 95%, volatility corresponds to the 12 months prior to the event and the estimated VaR for a maintenance period of 1 day; (⁴): Stock B Soquimich (SQM-B) Series.

VaR is estimated for a single day and is written in percentages and compared with the effective event losses. In all cases, the effective loss was greater than the estimated loss by VaR .

Table III shows the estimated VaR for different windows of time: for 1 day, 1 week (5 days), 1 month and 12 months. The estimated VaR is also compared with the effective losses in each window. It is noted that the observed loss was bigger than the estimated by VaR except the window of 12 months for CSVA stock.

Table III

VaR estimate for different windows.

The maximum expected loss (*VaR*) for one day, one week, one month and 12 months is shown. The effective loss (Outcome Observed) for the event day, the week, the month and year are shown. Results (%) for Schwager S.A., La Polar S.A., Hites S.A., CSVA and Soquimich S.A. are listed below.

	Schwager ¹		La Polar		Hites		CSVA		Soquimich	
	<i>VaR</i>	Effective Returns	<i>VaR</i>	Effective Returns	<i>VaR</i>	Effective Returns	<i>VaR</i>	Effective Returns	<i>VaR</i>	Effective Returns
Event day	-0.83%	-23.08%	-0.22%	-42.12%	-0.27%	-4.93%	-0.41%	-15.89%	-0.24%	-17.05%
Event week	-1.86%	-25.00%	-0.48%	-31.59%	-0.61%	-4.93%	-0.91%	-12.47%	-0.53%	-15.86%
Event month	-2.04%	-25.16% ¹	-0.89%	-71.03%	-1.24%	-15.83%	-1.86%	-9.18%	-1.11%	-27.88%
Event year	-12.36%	-65.43%	-3.40%	-84.27%	-4.30%	-46.85%	-6.44%	-6.38%	-	-

¹: In the case of Schwager, the event occurred on November 08, 2005. The next day, on 09 November, the Superintendency of Securities and Insurance suspended the transaction this stock. The stock traded in the stock market one month later, on 09 December.

VI. Conclusions

In the context of Risk Management, it is typical to estimate the potential loss for a stock or portfolio by calculating the Value at Risk (*VaR*). The *VaR* of a portfolio investment is usually defined as the maximum expected loss (resulting from an adverse market movement), with a given confidence level for a certain period in the future. This is a great measure of risk because it is easy to understand. However, the *VaR* may underestimate the risk associated with investments in emerging markets –where new events show up unexpectedly, changing the level of risk in a given company–. In this article five cases from Chilean firms whose shares experienced significant increases in volatility were analysed: Schwager, La Polar, Hites, CSVA, and Soquimich. The results show that the observed loss was greater than the loss estimated by *VaR*. We expect and establish that the current methodology about risk management can be improved by considering the five cases in this article and their listed conclusion, based on the Chilean transitional economy from being labeled as emerging to developed economy.

The cases of La Polar and Shwager were using false information and were able to deceive the market and the regulatory agencies for years. In conclusion to these cases, the board of

directors did not do their job in full honesty, and after the scandal they did not have any legal or economic punishments. In the case of CSVA, unexpected changes in the industry forced extreme measures such as restructuring, but these measures were necessary even before the arrival of the new controllers. In the end, members of the previous board did not suffer any financial or legal penalties, but investors lost more than 16% of their investment in a day. Finally, the Soquimich case is more complex. It has issues such as the use of insider trading, use of confidential information, and political scandal payment for potential favors in regulating and monitoring the company by regulators. In this case, unlike previous conclusions, has implied lawsuits and potential penalties in Chile and the United States since it is a dual listed company.

For all cases presented in this article the response to mitigate these risks is greater oversight by regulatory agencies and corporate control. In particular, corporate boards should be independent and, of course, responsible for their actions. This should be implemented because of their access to information and ability to control actions at odds with the truth and corporate transparency. In economies in transition, such cases will be repeated and will be considered when medium to large companies have securities traded in developed markets. Thus, the regulatory requirements of sophisticated capital markets should be transferred to emerging markets to minimize these cases and make efforts for more effective risk management applied to managers and the market in general, including international investors.

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