

An Econometric Analysis for the Bid-Ask Spread in the Emerging Chilean Capital Market

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ABSTRACT

The purpose of this paper is to show that different methods for calculating the spread (Bid-Ask) and the methods for annualizing intra-day data affect the results of econometric models. To achieve our goal, we analyze different econometric models in the context of:

- i) the International Financial Reporting Standards (IFRS) adoption,
- ii) the reduction of information asymmetry due to new corporate governance standards, and
- iii) the ownership concentration that characterize the Chilean Capital Market. We test the quality of the information delivered to the market using two information disclosure indices (DIS and Botosan).

We find that the definition of spread and the methods for annualizing intraday data it is a key decision and may affect the statistical significance of the variables of a specific model.

JEL Classification:

Keywords: Spread (Bid-Ask), Econometric Modeling, IFRS, Information Asymmetry, Information Disclosure.

I. INTRODUCTION

The paper's purpose is to show the effect of choosing different spread definitions for modeling the relationship between information asymmetry and information disclosed by corporations that quote in the Chilean Capital Markets. Different methods for annualizing intraday data are, moreover, tested. The spread (Bid-Ask) calculated on intra-day shares from the Santiago Stock Exchange for 2007–2012 will be used as a proxy for information asymmetry. The quality of information provided to the capital markets is measured by two information disclosure indices (DIS and Botosan), in the context of IFRS adoption by Chilean accounting standards.

The paper contributes to the literature by offering an analysis that the definition of spread is not neutral and may affect the robustness of the different models we analyze. We test this in a small market with highly concentrated ownership. The average ownership share of the majority shareholder of the 40 stock son the Selective Stock Price Index (IPSA, in Spanish) is 41%, whereas in a random sample of 100 companies from the S&P 500, this share amounts to only 9% (Rubin, 2007; Coloma, 2010; Rapaport and Sheng, 2010). The market is primarily regulated by the Public Corporate Act and Stock Market Act, which are being modified to adjust to a globalized market and to protect minority shareholders. In the same context, the Superintendence Supervision of Securities and Insurance (SVS, in Spanish) plays an important role in issuing regulations that require sound practices in legal and corporate governance. In this paper, we analyze the effects on the Chilean market of adopting IFRS. Additionally, we consider it is necessary to identify whether a given company analyzed was listed on the IPSA in a given year because this factor will affect the instrument's liquidity.

The reminder of this paper is organize as follows, section II contains the literature review, section III describes the materials and methods, section IV analyzes the results and section V shows the conclusions and research implications.

II. LITERATURE REVIEW

Market efficiency is a central element of economic theory, and its importance is derived from the fact that the more efficient the markets are, the better resource allocation becomes. Many authors conclude that with lower levels of information asymmetry come lower costs of private equity, which in turn affects company growth and profitability (Gompers, Ishi and Metrick, 2003; Khurana, Pereira and Martin, 2006; Fu, Kraft and Zhang, 2012; Ghoul, Guedhami, Ni, Pittman and Saadi, 2013). Munteanu (2011) concludes in an extensive literature review that companies that seriously and voluntarily adopt IFRS observe a decrease in the cost of capital, while also finding that when the adoption is mandatory the quality of information is lower, albeit not significantly so. Armstrong, Barth, Jagolinger and Riedl (2010) analyze the impact of 16 events associated with the adoption of IFRS in Europe and conclude that adoption decreases the cost of capital, particularly in companies in which the quality of information was low and information asymmetry high prior to the adoption.

In the literature, there is also evidence of an existing relation between corporate governance and information asymmetry. For example, Cormier, Ledoux, Magnan and Aerts (2010) relate the quality of corporate governance, among other variables, with the number of independent directors and leverage (relative debt). Healy and Palepu (2001) develop a substantial literature review on the relation between disclosure decisions by management and their effects in the capital market. They conclude that demand for additional information disclosure is a response to agency problems between management and external investors. Kanagaretnam, Lobo and Whalen (2007) demonstrate that better corporate governance results in less information asymmetry. In their model, they relate the spread with variables such as independent directors and other features of the board, using company size as one control variable.

In addition, the quality of corporate governance has been measured by various indices. However, there is no general consensus on the matter. Verrecchia (2001) constructed a taxonomy of the indices and distinguished three types: indices based on associativity, discretionality and efficiency. The indices based on associativity measure the effect of disclosing one event on the behavior of investors and stake holders with reference to prices and transaction volumes (Lintner; 1969; Karpoff, 1987). The second index type measures the degree of discretion exercised by managers in information disclosure to positively influence company value (Trueman, 1986; Gigler and Hemmer, 1999). For disclosure indices based on efficiency, the efficacy of management establishing an information disclosure policy is measured in the absence of a priori knowledge (Marshall, 1974; Kunkel, 1982). There are many options for calculating the indices. One option is measurement at the request of the company being assessed, for example, when Standard and Poor's (2006) conducts an assessment at the request of a client. Another way to calculate the index of corporate governance quality is based on available public information. This approach is in line with the proposal of Haat, Mahenthiran, Rahman and Hamid (2006), who investigated a 17-item information disclosure index (DIS) that integrated aspects of information quality disclosed. Another proposal is an index constructed by Botosan (1997), which consists of 138 items in 18 groups and includes a wide spectrum of corporate information features disclosed', e.g., strategic information from the company, cash flow projections and segment information.

One way to measure information asymmetry is using the spread (Copeland and Galai, 1983), under the assumption that when market participants possess similar information, the spread should be lower. Traders expand the Bid-Ask to cover losses that result from possible information asymmetry (Glosten and Harris, 1998).

Additionally, the spread is considered to be a transaction cost for agents who wish to conduct a rapid exchange of shares for money. This difference is the compensation for the traders for operating without significant delay (Chan and Chung, 2012). The pace of exchange can be increased with narrower price movements by offering a smaller Bid-Ask. In competitive conditions, the Bid-Ask will measure the cost of conducting non-delayed operations (Demsetz, 1968). Thus, dealers offer immediate exchange, matching purchase and sale orders and maintaining inventories for orders that cannot be matched (Benston and Hagerman, 1974). Various studies have used the dealer spread to assess an increase in information asymmetry prior to an anticipated disclosure of an event, such as the publication of results or dividends by a company (Venkatesh and Chiang, 1986). The ways to calculate the spread and its modeling (Bollen, Smith and Whaley, 2004; Amihud and Mendelson, 1989) are not insignificant. The financial literature has used various measures of the spread. The spread can be calculated absolutely or relatively, in its original or modified scale, with or without the effect of past prices of the same shares or based only on put or call orders versus those which include the transfer price (see Table 1). Furthermore, the spread can be measured over different time periods (e.g., intra-day, daily, monthly, quarterly). To cite only a few examples of time measurement, Kanagaretnam *et al.* (2007) studied whether good corporate governance practices reduce information asymmetry near the time of publishing quarterly results and described the spread variable as the difference between the average percentage margin for each of the four days of the period during which results were announced and the average for a non-event period. Chen, Chung, Lee and Liao (2007) calculated the spread using the McNish and Wood (1992) formula, where by the stock quotation is considered in seconds and the number of seconds of daily negotiation is also observed.

Another approach is to estimate the spread instead of calculating the true spread, Roll (1984), Corwin and Schultz (2012); Corwin and Schultz shows that the estimate of the cross-sectional-correlation coefficient, high-low spread estimator and the true spread is about 0.9. Harris (1990) suggest that the Roll Bid-Ask spread model assumes that the underlying stock value follows a random walk that buy and sell orders are equally probable and serially independent, and that underlying value is independent of the order flow.

Table 1.

Main measures on the spread observed in the financial literature

Absolute (\$)	Relative (%)
$(PV - PC)$	$\frac{(PV - PC)}{(PV + PC)}, \ln(PV) - \ln(PC)$ 2
Original scale	Modified scale
$(PV - PC), \frac{(PV - PC)}{(PV + PC)}$ 2	$\ln(PV - PC), \frac{(\ln PV - \ln PC)}{(\ln PV + \ln PC)}$ 2
Relative at the present moment	Relative at a moment in the past
$(PV_t - PC_t), \frac{(PV_t - PC_t)}{(PV_t + PC_t)}$ 2	$\frac{1}{2} \left[\left(\frac{(PV_t - PC_t)}{(PV_t + PC_t)/2} + \frac{(PV_{t-1} - PC_{t-1})}{(PV_{t-1} + PC_{t-1})/2} \right) \right]$
Base only in peaks	Based on transaction price
$(PV - PC), \frac{(PV - PC)}{(PV + PC)}$ 2	$2 \left PT - \frac{(PV - PC)}{2} \right , 2 \left \frac{(PT - \frac{PV - PC}{2})}{\frac{PV - PC}{2}} \right \times 100$

In Table 1, PC is the purchase price of the request made, PV is the selling price of the request made, PT is the price of the transactions actually performed.

Regarding institutional investor participation in company ownership, it is worth noting that the Organization for Economic Co-operation and Development (OECD) (2011, p. 3) views the role of institutional investors in Latin America as more critical than in other parts of the world in “supporting the development of the markets in order for them to function properly and be sustained by good corporate governance practices”. This importance results from the high ownership concentration that prevails in Latin American markets and the existence of risk for minority shareholders. Dennis and Weston (2001) found that the relation between institutional equity and the spread is negative and significant as opposed to Sarin, Shastri and Shastri (1996), who found a significant (positive) relation. In general, Dennis and Weston’s results indicate diminished liquidity with concentrated ownership.

Our study considered the participation of institutional investors in the ownership of sample companies, which provides them the right to an independent director¹. Additionally, to visualize the concentration of ownership in the Chilean market, which significantly affects liquidity, Rubin (2007) identified the ownership controlled by the five largest shareholders.

Florou and Pope (2012) analyze the effects of IFRS adoption and conclude that the better quality of financial statements has influenced the behavior of institutional investors. Soderstrom and Sun (2007) demonstrate that the impact of IFRS adoption depends on the economic and legal environment. The same processes do not occur in countries in which the legal system is based on the French civil code or on Common Law. Greenstein and Sami (1994) analyze the effects of the Securities and Exchange Commission’s (SEC) regulations on the obligation to report by

¹ The “Enersis Case” persuasively argues for the importance of independent directors. In this case, the independent director and the Chilean pension fund representatives requested a ruling from the SVS on the relative increase in capital proposed by the majority shareholders of Enersis S.A. and forced the company to disclose information on its investment plan (Economía y Negocios, 2012).

segments on the spread and demonstrate that these regulations decreased the spread. Assidi and Omri (2012) demonstrate that among the companies on the Paris stock exchange that comprise the CAC 40 index, the companies that adopted the IFRS significantly improved the quality of information and mitigated information asymmetries, both measured by the Kothari, Leone and Wasley (2005) model.

Bakhshi, Bazrafshan, Rezaei and Fereidouni (2011) analyzed the effects of corporate governance on the spread, specifically in reference to equity held by company management and independent directors. These authors concluded that the spread increases when management has a larger stake and decreases when the majority of shares are owned by other investors; particularly, institutional investors and independent directors.

When a company is traded on the home country stock exchange and on the North American stock capital market, it is necessary to control the model data for a variable that differentiates the American Depositary Receipts (ADR) because such companies are subject to different regulations regarding the disclosure of public information. The issuance of ADR simplifies the adoption of regulations additional to those that apply in the country in which the shares are originally traded (i.e., the US SEC regulations on trading on the New York Stock Exchange (NYSE)). These additional regulations require additional shareholder protection compared with the regulations in place in emerging countries (Chung, 2006). This additional protection results in less information asymmetry, and, therefore, the spread becomes narrower.

Lin, Sanger and Booth (1995) examine the relation between the transaction volume and the spread and conclude that volume is positively related to the average spread. In addition, they observe that the transaction volume is different at different times of day, with a higher volume during the first hours of trading, when pending transactions from the previous day are being concluded.

As noted in the literature review, the hypotheses presented in this investigation are as follows:

Hypothesis 1. The definition of spread used affects the robustness of the model.

Hypothesis 2. The method used to annualize intra-day data affects the robustness of the model.

III. MATERIALS AND METHODS

Exploratory empirical analysis is conducted on a sample of 12 companies traded on the Santiago de Chile Stock Exchange, whose trading names are: Aguas-A, Andina-B, Antarchile, Colbún, Conchatoro, Copec, CTC-A, Endesa, IAM, Masisa, Ripley and SK. The majority of the selected companies maintained a presence on the IPSA for the entire 2007–2012 period. The sample companies represent 27% of the total market capitalization of the companies traded on the IPSA (the 40 most important companies) as of December 2012. On average, these companies conduct 33,850 annual stock market transactions (in 2012), which is more than the average transaction count of all of the publicly-traded companies in Chile (15,283).

The data related to stock market operations were obtained directly from the Santiago Stock Exchange, and the data on the companies and the quality of their publicly available information were obtained from financial statements acquired from the SVS. All of the data are annual and synthesize the transactions of the companies during the financial year.

According to the purpose of this study and the literature review, we use a set of factors that determine information asymmetry to assess the ability of the proposed model to generalize based on the sample. Therefore, the general model includes the spread as an endogenous variable, which corresponds to a series of share purchase and sale prices of the sample companies. The spread has been measured in four ways;

- (i) the annual average of the differences between both prices (Spread_A_B),
- (ii) the annual average of the natural logarithm of the differences between both prices (Ln_Average_Spread),

- (iii) the average spread weighted by the stock quantity traded (Weighted_Spread), and
 (iv) the annual average of the differences between both prices divided by its average value (Average_Spread). Gjerde, Mahenthiran and Cademartori (2013) annualized the spread using the ratio of the absolute value of daily return, divided by daily cash volume, then weighted and summed over the number of days in the year in which a trade occurs.

The magnitude of the four variables of spread are different (Table 2). Weighted_Spread and Simple_Spread have significantly larger magnitudes comparing to the others two variables. Similarly the differences in the four statistical moments are also great.

Table 2.
Descriptive analysis of variables of spread

	Weighted_Spread	Simple_Spread	Average_Spread	Ln_Average_Spread
N	2 002 746	2 002 746	2 002 746	2 002 746
Mean	3 004 468 254	1 296 432 846	0.006675241	0.00669037
Standard deviation	7 929 492 038	5 661 541 091	0.013682464	0.01676721
Skewness	3 513 965 943	4 120 631 873	2 603 666 214	145 355 836
Kurtosis	4 726 756 606	2 594 936 244	2 037 467 199	529 968 225
Minimum	0	0	0	0
Maximum	17 820 399.77	4 770	19 957 716	6 851 185

Source: Authors' calculations.

A cross-sectional model, using the ordinary least squares method, for this empirical application was used in which the companies and periods were combined for each of the model's cross sections. And we also used different ways to measure the endogenous variable, presenting the results for each of the four models obtained in the Table 4.

The general model in its functional form is specified by the following equation:

$$\text{Spread}_i = \beta_0 + \beta_1 * \text{Sale_Quant}_i + \beta_2 * \text{Pur_Quant}_i + \beta_3 * \text{IFRS}_i + \beta_4 * \text{Mean_Dis}_i + \beta_5 * \text{Kurtosis_DIS}_i + \beta_6 * \text{Leverage}_i + \beta_7 * \text{Ln_Assets}_i + \beta_8 * \text{ADR_Issue}_i + \beta_9 * \text{IPSA}_i + \beta_{10} * \text{Own_5_Shareholders}_i + \beta_{11} * \text{Own_InstInv_PF}_i + \beta_{12} * \text{Botosan}_i + \mu_i$$

where:

- Spread_i : the difference between of the share purchase and sale price for the sample companies,
- Sale_Quant_i : the quantity offered for the sale of sample company shares,
- Pur_Quant_i : the quantity offered for the purchase of sample company shares,
- IFRS_i : the dichotomist variable that sums the value of 1 if company "i" adopts IFRS and 0 in the contrary case,
- Mean_DIS_i : the sample company information disclosure index (calculated by mean value),
- KurtosisDIS_i : the sample company information disclosure index (calculated by the kurtosis),
- Leverage_i : the leveraging of the sample companies' debt,
- Ln_Assets_i : the natural logarithm of the sample companies' assets,
- ADR_Issue_i : the dichotomist value that assumes the value of 1 if company "i" issues ADR and 0 in the contrary case,
- IPSA_i : the dichotomist value that assumes the value of 1 if company "i" is traded on the SSPI and 0 in the contrary case,

- $Own_5_Shareholders_i$: the ownership percentage of the five main shareholders of the sample companies,
- $Own_Inst_Inv_PF_i$: the participation of institutional investors in the ownership of the sample companies, particularly in the case of pension funds (PF),
- $Botosan_i$: the sample company information disclosure index, we use the value obtained by calculating the 138 items and,
- μ_i : random error.

Table 3 shows the primary data from the exploratory analysis of the continuous exogenous variables presented in the empirical analysis. The Table shows that the values of the variables are fairly heterogeneous. Certain variables ($Sale_Quant$ and Pur_Quant) have values that are substantially higher than in the case of other variables (i.e., $Kurtosis_DIS$ and $Leverage$). Additionally, the level of ownership concentration of sample company shareholders is notable. The average percentage share of the five main shareholders is 70%, and the company with the highest ownership concentration (the telecom CTC-A) boasts 98.5%. The percentages of ownership participation of the institutional investors, pension funds ($Own_Inst_Inv_PF$) amount to an average of 6.5%, with a ceiling of 26% (the case of Aguas Andina S.A., whose shares are denoted Aguas-A).

Table 3.
Descriptive analysis of continuous model exogenous variables

	Mean	Maximum	Minimum	Stand. Dev.	Asymmetry	Kurtosis
$Sale_Quant$	26683.21	150401.2	1 142 669	33196.39	1 791 883	5 522 053
Pur_Quant	25468.10	162203.1	1 193 516	33179.99	1 999 314	6 670 038
$Mean_DIS$	0.602124	0.741176	0.482353	0.068438	0.085244	2 473 136
$Kurtosis_DIS$	-0.971111	0.190170	-1 833 589	0.475957	0.764296	3 087 189
$Leverage$	0.912788	1 566 445	0.509735	0.252914	0.557354	2 782 955
$Botosan$	3 724 306	5 550 000	2 500 000	6 957 615	0.372145	2 200 716
Ln_Assets	2 091 857	2 310 814	1 467 406	1 721 432	-2 366 565	9 771 537
$Own_5_Shareholders$	6 961 917	9 850 000	7 690 000	1 821 537	-0.730911	3 758 112
$Own_Inst_Inv_PF$	6 502 986	2 647 000	0.000000	6 758 253	1 115 546	3 610 577

Source: Authors' calculations.

IV. RESULTS

The results of the four models with endogenous variable measured by: $Spread_A_B$, $Ln_Average_Spread$, $Weighted_Spread$, and $Average_Spread$, are shown in Table 4 and Table 5. Table 5 presents results of the accuracy of the adjustment for these models, observing the fit indices (coefficient of determination and adjusted coefficient of determination) we can see that, despite that the $Weighted_Spread$ model has the best adjustment index, the $Ln_Average_Spread$ model has the highest number of significant coefficients. This model also shows a good quality of adjustment measure by the criterion of Akaike, Schwarz and Hannan-Quinn. Thus the best model to represent the variability of the asymmetry of information through the spread is that in which the endogenous variable is measured through the difference of the logarithm of the share purchase and sale price for the sample companies.

For this model, the results presented in Table 4 enable us to observe the individual significance levels and the joint levels for model variables at 95%², with the exception of the variables Ln_Assets and Botosan, which are 90% significant. The variability of the endogenous variable is explained in 56% of the sample by the variability of the exogenous variables. Additionally, the model presents adequate information criteria (Akaike, Schwarz, Hannan-Quinn³). The hypotheses associated with the model residuals do not present residual autocorrelation⁴ or heteroscedasticity problems⁵.

Table 4.

Estimation results of different endogenous variables

<i>Endogenous variable Spread_A_B model</i>								
Variable	Sale_Quant	IFRS	Kurtosis_DIS	Ln_Assets	IPSA	Own_Inst_Inv_PF	Botosan	C
Coefficient	-0.000559	1 316 211	-9 996 496	-2 509 044	-2 527 352	-1 594 019	-1 598 691	1 760 416
Stand. Dev.	0.000161	1 129 104	1 131 181	3 370 909	1 530 891	0.812351	0.777754	7 176 484
t-statistic	-3 468 546	0.116571	-0.883722	-0.744323	-1 650 902	-1 962 229	-2 055 524	2 453 034
P-value	0.0009	0.9076	0.3802	0.4594	0.1037	0.0541	0.0439	0.0169
<i>Endogenous variable Ln_Average_Spread model</i>								
Variable	Sale_Quant	IFRS	Kurtosis_DIS	Ln_Assets	IPSA	Own_Inst_Inv_PF	Botosan	C
Coefficient	-6.44E-08	-0.008294	-0.003138	-0.001144	-0.020018	-0.000680	-0.000285	0.073754
Stand. Dev.	3.15E-08	0.002207	0.002211	0.000659	0.002993	0.000159	0.000152	0.014030
t-statistic	-2 044 404	-3 757 396	-1 418 986	-1 736 439	-6 688 553	-4 283 220	-1 874 882	5 256 831
P-value	0.0450	0.0004	0.1608	0.0873	0.0000	0.0001	0.0654	0.0000
<i>Endogenous variable Weighted_Spread model</i>								
Variable	Sale_Quant	IFRS	Kurtosis_DIS	Ln_Assets	IPSA	Own_Inst_Inv_PF	Botosan	C
Coefficient	-5.73E-08	-0.007219	-0.003130	-0.001007	-0.018775	-0.000570	-0.000169	0.062779
Stand. Dev.	2.68E-08	0.001876	0.001879	0.000560	0.002544	0.000135	0.000129	0.011923
t-statistic	-2 139 891	-3 848 106	-1 665 459	-1 797 226	-7 381 336	-4 223 234	-1 309 305	5 265 158
P-value	0.0362	0.0003	0.1007	0.0770	0.0000	0.0001	0.1951	0.0000
<i>Endogenous variable Average_Spread model</i>								
Variable	Sale_Quant	IFRS	Kurtosis_DIS	Ln_Assets	IPSA	Own_Inst_Inv_PF	Botosan	C
Coefficient	-4.27E-07	-0.009906	-0.030265	-0.001574	-0.114091	-0.002722	0.000448	0.148765
Stand. Dev.	2.01E-07	0.014086	0.014112	0.004205	0.019099	0.001013	0.000970	0.089531
t-statistic	-2 124 252	-0.703205	-2 144 594	-0.374363	-5 973 718	-2 686 135	0.461850	1 661 606
P-value	0.0375	0.4845	0.0358	0.7094	0.0000	0.0092	0.6458	0.1015

Source: Authors' calculations.

² P-value = < 0.0450.³ Akaike: -6.665764; Schwarz: -6.412801; Hannan-Quinn: -6.565058.⁴ Autocorrelation test: Durbin-Watson Test = 2.094, dl = 1.175, du = 1.799, $\alpha = 0.05$.⁵ Heteroscedasticity Test: White Test = F-statistic: 0.821750; P-value = 0.7155.

Table 5.
Summary estimation results of different endogenous variables

Endogenous variable	Number of Significant Coefficient (90%)	Determination Coefficient	Adjusted Coefficient of Determination	Akaike Criterion	Schwarz Criterion	Hannan-Quinn Criterion
Spread_A_B	4	0.29	0.22	10 414	10 667	10 519
Ln_Average_Spread	7	0.56	0.51	-6 666	-6 413	-6 565
Weighted_Spread	6	0.58	0.53	-6 991	-6 738	-6 890
Average_Spread	4	0.44	0.38	-2 959	-2 706	-2 858

Source: Authors' calculations.

Table 4 shows that the sign of the sale quantity of sample company shares (*Sale_Quant*) is coherent with economic theory (Demsetz, 1968). Thus, for each unit by which the sale quantity is increased, the spread value of the sample companies decreases by 6.44E-06%.

Regarding the measurement of the quality of corporate governance in each of the sample companies, measured by *Kurtosis_DIS* and *Botosan*, and its effect on information asymmetry, the signs were as expected. That is, at a higher level of sample company corporate governance, information asymmetry is lower, all other variables remaining equal. These results are in concordance with Cormier, Ledoux, Magnan and Aerts, W. (2010), they conclude that good corporate governance practice, such as board size and audit committee and voluntary governance disclosure, reduce asymmetry of information. The same reasoning is shown in Bakhshi, Bazrafshan, Rezaei and Fereidouni (2011).

As for the qualitative variable that measures IFRS adoption (IFRS) for each of the sample companies, when companies adopt international accounting standards, they have less information asymmetry than they would have in the contrary case because more information disclosure (primarily expressing assets, liabilities and equity in economic and not historical values) generates less information asymmetry for investors, which results in a lower spread (*ceteris paribus* the others factors). This result agrees with Assidi and Omri (2012), because they find that adoption of IFRS mitigate the asymmetry of information. Regarding the listing of sample companies on the IPSA, when a company belongs to this index, information asymmetry measured by the spread decreases by 2% compared with companies that were not listed on the IPSA during the study period.

Regarding control variables, for the natural logarithm variable of assets (*Ln_Assets*) as a measure of company size, larger companies have more resources to develop stronger corporate governance structures. Therefore, they disclose more information, which decreases information asymmetry and lowers the spread (all other variables remaining equal).

The negative effect of the control variable PF institutional investor ownership (*Own_Inst_Inv_PF*) on the spread can be explained by the fact that a greater participation of institutional investors in the ownership of companies leads them to fulfill a fiduciary role and to safeguard the quality of corporate governance and the adequate use of contributed resources, which in turn increases trust among investors. Therefore, the difference between the purchase and sale value of a share (spread) is smaller.

There is a strong correlation between two variables, shares sale quantity (*Sale_Quant*) and shares purchase quantity (*Pur_Quant*), in the sample companies. Therefore, the variable shares sale quantity captures information provided by the variable shares purchase quantity⁶. A similar conclusion was reached by Copeland and Galai (1983): they conclude that the Bid-Ask spread increases with greater price volatility in the asset being traded, with a higher asset price level,

⁶ Correlation Coefficient = 0.992140, P-value = 0.0000.

and with lower volume. Other non-significant variables included in the study are the following: whether the company issues ADRs, the level of leveraging of a sample company's debt (Leverage) and the ownership percentage of the five main shareholders of sample companies. As for the latter, a high concentration of ownership in the hands of the five main shareholders may not be significant. Although they share among themselves important information that they would not be willing to publish without appropriate regulations, the legislation and regulations of the SVS forces the companies to issue an information handling manual, which is of interest to the market⁷. This phenomenon can largely explain the small significance of the other variables.

V. CONCLUSIONS AND RESEARCH IMPLICATIONS

This study has used different models to measure the relation between: variables related to the quality of corporate governance, control variables, with the spread. To validate the above relations different measures of spread were used, for which different econometric models have been used. We find that the different ways for measuring the spread is not indifferent, affecting the goodness of fit of the proposed models.

Regarding the paper's hypotheses, the definition of spread used affects the robustness of the model, so, when we used the natural logarithm of the differences between ask and bid prices as a measure of the spread, it has the best indicators of goodness of fit of all models tested, which supports hypothesis 1. And, the method used to annualize intra-day data affects the robustness of the model, so, in our case when we annualize our intra-day data, as the annual average of the natural logarithm of the differences between ask and bid prices, we obtain the best fit of our model, which supports hypothesis 2.

When the sample is extended to all of the companies that were listed on the IPSA at any time during the study period, the general model variables will still be incorporated and may possess increased relevance for future research as information disclosure regulations and other issues of corporate governance are strengthened. This will give us the opportunity to try other kinds of models, perhaps using multivariate time series methodology or panel data models (de la Fuente et al., 2015; Coughenour et al., 2016).

Thus, the Chilean market shows similar characteristics of other emerging markets, where there is high ownership concentration, lower liquidity, and lack of transparency.

The finding suggests that regulators should produce new regulations to improve the quality of corporate governance and the information disclosed to the market in order to reduce information asymmetry and make the Chilean market more efficient and this also holds for other emerging markets.

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⁷ The information handling manual is required by General Norm No. 211 (SSI, 2008) and the Mercado de Valores Law No. 18.045.

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