Exploring Determinant Factors of Bond Trading with Inventory Management Theory (Case Study of Indonesian Capital Market, January – March 2009)

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This paper studies trading volume of 206 recorded and publicly traded bonds in Indonesian Capital Market on January 4th – March 9th 2009 observed period. The data covers almost all trading data in the market and all brokers that exist. The microstructure data used in this study is a complete understanding for almost every phenomenons in the market, and thus could explain more about bond liquidity. We find that some bonds are actively traded and most are rare. We also construct some determinant facto tests of bond trading volume, included descriptive statistic, GLS, and other formal test. We find that bonds with larger par value and more seasoned tend to have smaller trading volume. We also find that private bonds are actively traded more than public bonds (both government institution and private institution bond). Interest rate risk and bond price volatility are positively influence bond trading volume, but opposite for bond rating. We find that bond with higher probability to default have smaller trading volume. While comparing the bond volume data with stock price data, we find that the relationship in two markets is not linier as the convenient theory in finance said.

Keywords: *bond trading volume, liquidity, information transparency, substitution effect, private stock, default risk.*

Introduction

Based on selection priority, capital structure of a company consists of internal funding, which is retained earnings, and external funding, i.e. debts and equities (Keown, Martin, Petty, and Scott, 2004; Bodie, Kane, and Marcus, 2003; and Ross, Weterfield, and Jordan, 2004). This paper uses bonds as an alternative for new investment financing before issuing stocks, as has been much observed on the Pecking Order Theory by Myers (1984 and 2001), Sunder and Myers (1999), Titman and Wessels (1988), Haris and Raviv (1991), Fischer, Heinkel and Zechner (1989), and Frank and Goyal (2003). However, earlier researches, either by literature or empirical study, are still stock-dominated rather than bond-observed (see Alexander, Edward, and Ferry, 2000). As an external financing, bonds and stocks are tend to negatively

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correlated. Some research are conducted in order to deeply study about the volatility relationship between equity and corporate bond yield (Fama and French, 1993; Campbell and Taksler, 2003).

Methodologies for pricing corporate bonds have abundantly been developed. Theoretic literature about it can be divided into two models, which are structural and reduced-form model (see Crouhy, Galai, and Mark, 2002; Campbell and Taksler, 2003; and McNeil, Frey, and Embrechts, 2005). In structural model, a company is assumed to be default if the debt value exceeds its asset and thus bondholders take control of the company and substitute the residue (see Black and Scholes, 1973; Merton, 1974; Bhattacharya and Constantinides, 1989; Crouhy, Galai, and Mark, 2002; Bluhm, Overbeck, and Wagnen, 2003; Campbell and Taksler, 2003; and McNeil, Frey, and Embrechts, 2005). In the same basis, Longstaff and Shwartz (1995) proved that corporate yield spread oppositely varies to the treasury yield. Collin-Dufresne and Goldstein (2001) also found that company issues new bonds will increase its default risk and decrease its recovery rate when default happens. Elton, Gruber, Agrawal, and Mann (2001) and Huang and Huang (2004) found that a structural model is hardly applied to investment grade corporate bonds for the default events are rarely happen.

On the contrary with the reduced-form model, which default probability and recovery rate follows exogenous stochastic (Crouhy, Galai, and Mark, 2002; Campbell and Taksler, 2003; McNeil, Frey, and Embrecht, 2005). This model allows premium as investor's compensation for liquidity risk and credit systematic risk (Campbell and Taksler, 2003). Both risks are econometrically appropriate for swap spread data and corporate bond yield (Jarrow and Turnbull, 1995; Duffie and Singleton, 1997, 1999; Duffee, 1999; and Liu, Longstaff, and Mandell, 2000). Unlike structural model which strictly assumes its model (see Merton, 1974) and Crouhy, Galai, and Mark (2002), reduced-form model relatively more flexible (see Crouhy, Galai, and Mark, 2002). Hence, reduced-form model relatively much more used in corporate bonds pricing (Campbell and Taksler, 2003).

Many research have been conducted in order to define various external variables related to yield spread determination of corporate bonds (see Nelson and Siegel, 1987; Elton, Gruber, Agrawal, and Mann, 2001; Campbell and Taksler, 2003). Pinches and Mingo (1973), Pogue and Soldofsky (1969), and Ederington, Yawitz and Roberts (1984) found that one variable affecting yield spread and corporate bond liquidity is bond rating, while Merton (1974) studied the term structure of interest rate as the variable. Fama and French (1993) and Campbell and Taksler (2003) linked bond yield spread and stock volatilities based on the framework of Merton (1974). Kwan (1996) proved that bond yield changes are negatively correlated to the changes of stock prices. Duffee (1998) showed that corporate bond yield spread is strongly correlated to the callable bond's treasury rate, rather than non-callable ones (see also Longstaff and Schwartz (1995)). While Elton, Gruber, Agrawal, and Mann (2004) identified about the effects of tax to yield spread.

Collin-Dufresne, Goldstein, and Martin (2001), Huang and Huang (2004), Chen, Lesmond and Wei (2005) stated that bond yield spread changes cannot be perfectly explained by various credit risk offered by structural model. Longstaff, Mifthal, and Neis (2004) defined illiquidity as possible explanation in failure of structural model in seizing this yield spread variation (see also Grinblatt, 1995; Duffie and Singleton, 1997; Collin-Dufresne, Goldstein, and Martin, 2001; Elton, Gruber, Agrawal, and

Mann, 2001; and Campbell and Taksler, 2003). Brennan and Subrahmanyam (1996) studied investor's demand on risk premium of a security's illiquidity. Furthermore, Lo, Mamaysky and Wang (2004) analyzed relationship between cost of liquidity and security trading frequency. This is primarily because of investors cannot continuously hedge the risk, and thus demand of its premium will reduce the price of the security (see also Constantinides, 1986). Hence, for bonds with the same (promised) cash flow, which bonds are less liquid, will be rarely traded, having a low price, while high yield spread (see also Chen, Lesmond, and Wei, 2004, 2005).

Amihud and Mendelson (1991), Brennan and Subrahmanyam (1996), and Datar, Naik, and Radcliffe (1998) explained about whether investors will ask higher return for less liquid securities, which return will be translated into higher cost of capital. According to the above explanation, we can derive that liquidity is expected to be valued in yield spread. While Chen, Lesmond, and Wei (2005) ran a researches about effects of bond liquidity to yield spread by using three liquidity measurements, i.e. bid-ask spread (see also Schultz, 1998; and Chakravarty and Sarkar, 1999), liquidity proxy of zero return (see also Lesmond, Ogden, and Trzcinka, 1999; and Bekaert, Lundblad, and Campbell, 2003), and liquidity estimator based on variant model of Lesmond, Ogden, and Trzcinka (1999). Further discussion about this variant model can be seen on Lesmond, Ogden, and Trzcinka (1999), Lesmon (2004), Glosten and Milgrom (1985). On the other side, Kamara (1994) used volume as liquidity size, while Sarig and Warga (1989) explained bond's maturity as a proxy of bond's liquidity. Further discussion regarding bond's liquidity can be seen on Fisher (1959), Cornell and Green (1991), Warga (1992), and Crabbe and Turner (1995).

In summary, this research will use volume as a proxy for liquidity (see Kamara, 1994; and Alexander, et. al. (2000)). Using transaction volume as a liquidity component will help us understand bond liquidity with high yield, while it can also provide a better test hypothesis of the determining factors of bond liquidity (see Alexander, et. al., 2000). According to the theory of supply, volume should be positively related to the issue size and conversely to the lifespan of bonds, while bonds issued by private company (company which stocks are not traded publicly) should have lower volume of transaction (see also Alexander, et. al., 2000)).

Nevertheless, this research also admits that volume is not a perfect measurement of liquidity (see also Alexander, et. al., 2000). Occasionally, inconsistent results appear in our observation, where high transaction volume happens on low period of liquidity, which is usually, happens in high risk period when transaction cost is increasing (see Bamber, 1986; Krinsky and Lee, 1996; and Alexander, et. al., 2000). Non-liquidity factors causes such the above things happen may be comes from default risk, interest rate risk, or may be because of volatility return of the bond. Hence, in order to use volume as a liquidity measurement, a control for various non-liquidity factors of the volume is necessary (see Alexander et. al., 2000).

Many observations conducted regarding bond transaction volume, i.e. Garbade and Silber (1976) and Alexander, et. al. (2000) used bond data in USA, and Warga (1992) used bond data in Israel. Considering limited research related to bonds in Indonesia, this research will conduct an observation of determining factors of bond liquidity, which in this regard using volume as the measurement, in Indonesia capital market. And also by considering differences in characteristic of industry and risk profile among other countries where bond-based researches are amended in the comparison with Indonesia. Moreover, bond market in Indonesia began with development of long-term investment instruments based on fixed income.

Indonesian government has started to actively issued bonds with small nominal value expecting increasing of bonds trade liquidity in Indonesia through Obligasi Ritel Indonesia (ORI), in order to acquire funds from people. Besides issuing stocks, corporate also use bonds to procure long-term financing (see Siahaan, 2008). Those (using bonds for long-term financing) are not just conducted by publicly traded company, but also by private company.

With relatively limited study and research regarding bonds in Indonesia, and thus empirical understanding about bond market and its characteristics are still weak. Development of fixedincome-based instruments in Indonesia, move in tandem, shows positive signal to bond market development in Indonesia. Thus, empirical-based researches needed to be conducted recall that there are characteristic and condition differences between bond market in Indonesia and other countries, where literature regarding bonds is obtained, in industrial structure, economic system and also risk profile faced by investors.

There are some issues will be criticized in this research. First of all, the most important issue is regarding relationship between transaction volume and bond liquidity rate. Commonly, relationship between transaction volume and liquidity rate is positive. Though, there are some researchers showed contrary relationships (Bamber, 1986; and Krinsky and Lee, 1996). Secondly, there are some factors which also affecting bonds' transaction volume. Those factors can be divided into two major parts, which are factors included into liquidity group and others are not included into it. Finally, in common, researches regarding bonds transaction volume are merely focus only to factors related to liquidity. Meanwhile, factors not directly related to it (liquidity) are not commonly observed (see Alexander, et. al., 2000).

Based on above issues, we will try to formulate the purposes of this research, as follows : (1)to see relationship between transaction volume and liquidity rate of bonds in Indonesia bond market, with high yield, (2) to see relationship between bond transactions volume of two major groups in Indonesia. First group is public companies which are listed on Indonesia Stock Exchange, while the second group is private companies which are not listed on Indonesia Stock Exchange and (3) to explore the relationship or influence between non-liquidity factors and bonds transaction volume rate.

Literature Review

Bonds liquidity hypothesis

In order to fulfill customer's demand, dealers are usually hold bonds in large amounts, and thus they face a risk from bond price fluctuation in market (adverse price movements). Inventory carrying cost per unit bond with low transaction volume is usually higher than bonds with high transaction volume, which consequently followed by high transaction cost of low volume bonds. Hence, low volume bonds will be relatively less liquid compared to high volume bonds. By this logical reason, we will examine three hypotheses as follow:

Hypothesis 1: more bonds issued, higher transaction volume

Some previous researches stated that the amount of bonds issued will be a

[4] Anchoring is similar to conservatism, which means the slow updating of models in the face of new evidence. Barberis, et al. (1998) use conservatism to interpret the underreaction phenomenon in the financial markets.

determinant factor of bond liquidity (see Fischer, 1959; Garbade and Silber, 1976; Warga, 1992; and Crabbe and Turner, 1995). Those researches stated that dealers will be easier in managing high amount of bonds issued. Dealers of such high amount of bonds are tend to have low inventory holding cost, which followed by low transaction costs borne to the investors, and thus will affecting the bonds to be traded more frequently (see Fischer, 1959; Crabbe and Turner, 1995; and Alexander, et. al., 2000). Those researches will finally support the first hypothesis regarding volume trading, which more bonds issued will bring to higher volume.

This hypothesis is resembled to the hypotheses tested in the former researches, which more bonds issued will liquid they are (see Warga, 1992; and Crabbe and Turner, 1995). They used liquidity premium (they used liquidity premium, which is differences between yield or return to its benchmark) to measure liquidity. Usually, they found less proofs (or even no proofs at all) supporting the above hypothesis. Meanwhile, hypothesis built by Hotchkiss, Warga, and Jostova (2002) stated that more bonds issued, less bid-ask spread. Moreover, they found empirical evidence standing behind their hypothesis (see Alexander, et. al., 2000) for further discussion).

Hypothesis 2: the more seasoned bonds are, the more rarely traded they are

Issued bonds are able to be directly included to passive portfolio formed by investors, who tend to hold them ‘till maturity dates. Along with time, that passive portfolio will continuously absorb securities in market, which finally, will let only a small fraction of securities traded in market. Smaller fractions of securities traded in market, dealer will tend to ask higher spread, which will cause bond market to be less liquid (see Warga (1992), and Alexander, et. al. (2000)). Conclusively, more seasoned bonds are, less liquid they are.

Some former observations also support this second hypothesis, i.e. Sarig and Warga (1989), Amihud and Mendelson (1991), and Kamara (1994), who found that the newest issued securities have least liquidity premium. And also, Chakravarty and Sarkar (1999), Hotchkiss, Warga and Jostova (2002), and Schultz (2001) were deeply investigated about bid-ask spread. However, Blume, Keim and Patel (1991) could not show that return premium is related to lifespan of a security.

This research will later define bonds as seasoned issued bond, once it has a tenor more than two years. Should there any constant percentage of actively-traded float bonds which absorbed into passive portfolio at every period, it is therefore decreasing of trade volume should be nonlinear, which thus this research will then use 2-year cut-off in order to catch the nonlinearity. This bond definition is based on Alexander, et. al.(2000).

Hypothesis 3: private-issued bonds should have lower transaction volume than public ones

Private corporations, which defined as corporation which stock are not traded on exchange, could issue bonds traded for public. It is usually have lower transaction volume than bonds issued by public corporations listed in exchange (see Fenn, 2000:and Alexander, et. al., 2000). Fenn (2000) explained that this phenomenon is caused by more information can be gathered by public corporations rather than private ones. This might be caused by binding rules made by Badan Pengawas Pasar Modal (BAPEPAM - Indonesia Security Exchange Commission) that public company should follow. Although Fenn (2000) did not find enough empirical evidence to support his hypothesis regarding disclosure insufficiency of private company, however, if credit premium can be interpreted as liquidity premium, the result is consistent with the hypothesis.

Limitation of transaction volume as measurement of liquidity and requirement to control its determinant factor

As has been stated before that volume is not a perfect measurement of liquidity, liquidity itself can be defined as a capability to quickly sell securities with relatively low cost (O'Hara, 1995; and Ross, Weterfield, and Jordan, 2004), which speed measurement of liquidity (security conversion in cash through trading) is less than a year (see Keown, Martin, Petty, and Scott, 2004; Bodie, Kane, and Marcus, 2003; and Ross, Weterfield and Jordan, 2004).

Based on definition of liquidity by O'Hara (1995) and Ross, Weterfield, and Jordan (2004), prime foible of volume as liquidity measurement is because of that transaction volume does not include cost of trading which is usually measured by effective/quoted spreads (see Alexander, et. al., 200). Nevertheless, Admati and Pfleiderer (1988) and Foster and Viswanathan (1993) predicted that bonds with high transaction volume usually has lower bid-ask spreads. This is true based on some other empirical studies using stock data which justified this hypothesis (see Foster and Viswanathan, 1993). Kamara (1994) and Alexander, et. al. (2000) used transaction volume to measure liquidity (see also Datar, Naik, and Radcliffe, 1998; and Chakracarty and Sarkar, 1999).

Although transaction volume is commonly positively correlated with liquidity, occasionally, volume of transactions is high in low liquidity when transaction cost is high (see Alexander, et. al., 2000). For example, Bamber (1986) and Krinsky and Lee (1996) found evidence that volume of transactions and bid-ask spread of bonds are relatively high when bond issuer company announces company's income. Bachelier (1900), Harris and Raviv (1993), Kandel and Pearson (1995), and Bamber, Barron, and Stober (1999) explained that those signs are speculative components of volume, which happens when there are different opinions to the real value of financial asset.

Hence, in order to conduct a valid testing to liquidity hypothesis, we carry out controls to the various determinant factors of those speculative components of volume (see also Alexander, et. al., 2000). First of all, we control the volatility return, which is based on theorem of Harris and Raviv (1993), which stated that transaction volume has positive relationship with absolute value of price changes (see also Karpoff, 1987).

Once return volatility is considered as realized price changes, bid-ask spreads and transaction volume will then higher when expectation of asset price changes is higher. Thus, we might also need to control this ex ante risk rate. Meanwhile, bonds are at the elbow with this characteristic, since bonds have two ex ante risks, i.e. interest rate risk and credit risk (see Alexander, et. al., 2000). Hence, some researches are prone to use quoted/effective bid-ask spread rather than transaction volume, as stated by Schultz (2001) and Chakravarty and Sarkar (1999).

Methodology

Specification of estimated model used

In examining various determinant factors of volume, we use regression analysis as used by Alexander, et. al. (2000) to the relationship of two measurement of transaction volume and other various prime attributes of bond issuance and its issuer. This regression model use panel data, consists of pooled time series and cross sectional structure, and functional form used to explain transaction volume as follow:

$$\text{Trading Volume}_{it} = f\,(\text{Size}_{it}, \text{Tenor}_{it}, \text{Private Equity}_{it}, \text{Control Variables}_{it}) \quad (1)$$

Where *i* shows individual bonds and *t* as period of months observed.

This methodology is also recommended by Hsiao (2003) and Baltagi (2005) for data pooling when rather than short, data compilation is wide, e.g. comparison of 57 bond data within 24 periods of observation). More detail explanation regarding the above variables and the examining methodology will be followed explained on section 5.2.

We will conduct a testing to some formulas of equation (1), which will be different only on definition of the dependent variables. On the first formula, dependent variable reflecting transaction frequency and thus stated as natural logarithm of daily transaction volume average within a month. This logarithm formula is used to avoid wider dispersion if we use the bond's daily transaction volume itself. On the other formula, dependent variable use relative transaction quantity measurement which defined as average natural logarithm of daily transaction volume within a month. By using monthly interval, we can restrict possibility of time inexpediency to some independent variables. For example, nominal value of outstanding bonds could change on two things, i.e. because of open market purchase and sinking fund usage. However, it is difficult to predict the exact changing time, and thus monthly interval can be used to restrict mistakes made by this inexpediency.

We will conduct data examining as an indication of autocorrelation, cross sectional heteroscedastisity, and cross sectional correlation as a requisite for exact pooling methodology. By using this methodology, we apply five steps on each formula of the above equation (1). First step is to apply Ordinary Least Square (OLS) regression model to the pooled data to estimate monthly residual for each bonds. Secondly, for each bonds, first-order correlation is estimated and evaluated for statistic significance. If, for example, on a month, a bond has a significant correlation coefficient, the data will be transformed based on first-order autoregressive scheme.

The third step is application of OLS, once more, to data unimpeded from autoregressive property. Forth, eliminating heteroscedasticity by dividing residual standard deviation for each bonds by previously transformed data. Finally, with autocorrelation and heteroscedasticity which has been removed from the data, we will re-estimate the model parameter by OLS regression. The result then is hopefully fulfilling appropriate statistic property for inference process and hypothesis testing. Below is detail explanation of various explanatory variables used in this research.

Explanatory variables used

• Size of issued bonds

To test the relationship between size of the issued bonds with the transaction volume rate (hypothesis 1), we take natural logarithm from par value of bonds with million rupiahs nominal. On regression model, this variable is noted by Ln(Size). Further discussion regarding can be seen on Crabbe and Turner (1995) and Alexander, et. al. (2000). Bond liquidity in secondary market is also influenced by purchasing power of investors or dealer in market. Bond price in market is also determined by par value of the bonds itself, and thus higher par value of bonds less investors or dealers able to buy such bonds. Hence, this research will then hypothesize that higher par value of a bond, less liquid the bond is. This hypothesis is different with Alexaander, et. al. (2000).

• Tenor of bonds

In order to testing hypothesis 2 of this research, we put variable to measure bond seasoning. As explained earlier that relationship between tenor and volume is nonlinear, for transaction volume shows decreasing for the first 2 year of bond issuance and followed by stability on low rate (see Alexander, et. al. (2000) for further discussion). This 2-year cut-off is used according to Blume, Keim and Patel (1991) and Hotchkiss, Warga and Jostova (2002). Warga (1992) explained that this pattern might be reflecting a tendency of bonds to be included to investors' portfolio within the first two years of the bonds' tenor and thus traded sparingly after two years. Therefore, tenor as explanatory variable is stated as dummy which valued one if bonds have two years outstanding tenor, or less and can be value as nought if the bonds' tenor is longer than two years. But, generally, we hypothesize that bonds with less than two years outstanding since issued are more liquid that bonds outstanding more than two years.

• Private stocks

To test hypothesis 3, we include dummy variable which will be valued as one if bond issuer is private company, and valued as nought if the issuer is public company along such month. Based on built hypothesis, the dummy coefficient variable of private company's stock should be negative. This negative token show that private company's bonds are less liquid as a cause of less information received by investors. This hypothesis is following Alexander, et. al. (2000).

Control variable

In order to test for valid liquidity hypothesis, we conduct a control of various determinant factors of speculative non-liquidity components of volume. Control variables which will be added to this research are as follow:

• Default risk = credit rating

This variable is dummy variable which will be valued as one if the observed bonds are rated as CCC or lower, or not rated within a month, and will be valued as nought if the observed bonds are rated as B or higher. We use rating distribution as used by S&P, which consists of rating category A (AAA, AA and A), rating category B (BBB, BB and B), rating category C (CCC, CC and C), and default rating category (D). However, in this research, we define bonds with default risk once they rated in rating category C (see also Alexander, et. al. (2000)). Hence, the dummy variable coefficient should be positive if bonds with higher ex ante risk have higher volume.

• Interest rate risk

We used bonds duration to measure interest rate risk, which depends on the price when bonds are issued and its call provision (if any). As for the default risk dummy variable, duration coefficient should also be positive. If bonds are sold at price (exactly) below its nominal value, either having provision or not, then modified duration is used to calculate on the maturity date and the maturity date value (see Tuckman (2002)). Once bonds are sold above its nominal value and don't have call provision, we will also use modified duration. However, if bonds are sold above its nominal value and have call provision, then we will use following procedure. First, if not callable yet, we use duration to call, which the same with its modified duration which is calculated on call date base and call price. Secondly, if callable is within a month, we will then use effective duration which is counted for 25 basis point-fluctuations (upward or downward shift) in its yield to maturity (see Alexander, et. al. (2000) for further discussion and Tuckman (2002)).

• **Price variability**

Price variability is defined as absolute average value of daily change percentages in price weighted average volume. We use price weighted average volume to minimize bid-ask bounce effect in this variable. Price variability should have positive relationship with transaction volume (to see deeper regarding the use of his variable, see Karpoff (1987) and Alexander, et. al. (2000)).

Based on the above explanations of all dependent and independent variables, we noted model will be tested in this research as follow:

$$\text{Trading Volume}_{it} = \beta_0 + \beta_1 \ln(\text{Size})_{it} + \beta_2 \text{Tenor} + \beta_3 \text{Private Equity}_{it} + \beta_4 \text{Credit Rating}_{it} + \beta_5 \text{Duration}_{it} + \beta_6 \text{Price Variability}_{it} + u_t \quad (2)$$

Result and Discussion

Data Analysis and Bonds' Daily Volume

We analyze data from transaction note of Indonesia Stock Exchange (IDX) to 206 bonds since January 4th 2009 to March 9th 2009. Data used in this research are data of sovereign bonds, state-own enterprises' or even private company's bonds. Coverage of data used are price, volume, transaction time, coupon rate, sample bond rating. While also, data of price and daily transaction volume of stocks from non-sovereign bond issuer within the same period is needed as well.

Some transactions are conducted through brokers or dealers which reporting both side of a transaction, sale and buy. This practice results double reporting of the volumes traded[1]. In order to fix this matter, we try to separate between selling and buying transaction which has the same transaction time (date and hour), bond identity code, volume, price and yield. We later only use transaction data which are typically unique to be used in this research[2].

Characteristics of 206 bonds used as sample can be seen on Table 1. Composition of 206 bonds are consists of 60 bonds issued by government (i.e. 47 sovereign bonds, 2 Islamic sovereign bonds, 5 retail sovereign bonds, 5 treasury bonds, and 1 SUKUK sovereign), 49 bonds issued by 18 state-owned or local state-owned enterprises, and 97 bonds issued by 53 private companies. From 71 state-owned/local state-owned company and private company, there are only 40 companies which stocks are traded publicly on IDX within the observed period, January 4th 2009 to March 9th 2009. This shows that IDX does not strictly requiring stocks of the bond issuer companies should also be traded publicly[3]

Table 1 also shows that average size of bonds is IDR 2,280 billion at par, which are relatively new wince the average time

[1] Furthermore, we found that 8168 of 8174 transactions are having this double book-keeping phenomenon. This is natural as found by Alexander, et. al. (2000: 186)

[2] Technically, we sort the data based on transaction time and then coding 1 and 0, which means that 1 shows the same transaction for all bonds' transaction characteristic. We later separating transactions with code 1 from 0, and use only transaction with code 0.

[3] In this research, we found 31 bond issuer companies, which bonds are publicly traded, doesn't have stock that actively and publicly traded on the exchange. This is the same as policy of NASDR, as stated by Alexander, et. al. (2000:187).

from the issuance date is only 2.87 years, while bonds average tenor is 7.13 years and maturity date average is 4.25 years. As much as 99.50% bonds are listed within only 6 months from they're issued, and only 0.50% bonds are listed after 6 months (and less than a year) from the issuance. It is different with Alexander, et. al. (2000:187), where they found that more than 70% bonds are listed within 2 years after issuance, and less are listed within 6 months after issuance.

Table 1 also shows dissemination of bonds rating[4], which shows that major bonds are rated as AAA[5], as much as 68 sovereign bonds (which consists of 60 bonds issued by government, 5 stated-owned corporation bonds, and 3 private company bonds), while 52 bonds rated as AA (which consists of 32 bonds issued by state-owned company and the rests are issued by private company), 54 bonds are rated as A (which consists of 9 state-owned bonds and 45 are private ones), 17 bonds are rated as BBB (which consists of 3 state-owned bonds, and the rests are private ones), 2 bonds rated as C (which all are issue by private company), and 6 bonds are rated as D (also fully issued by private company).

We calculated four volume measurements in order to acquire a complex and deep delineation trough perspective of frequency and quartile of bonds transaction, as shown by Table 2. Average daily transaction is an indicator of transaction frequency, as a percentage of days when bonds are traded at least once in that day. Meanwhile, average total bonds traded each day represent transaction volume.

Table 2 shows that bonds listed to the exchange are relatively rare to be traded, besides in small quantity. By using SEC (1991), bonds are categorized as actively traded if they are traded for at least by 2 transactions within a week. While on the other side, more than a half bonds are traded twice a week. Where from its 50% highest values, which are one-fifth bond transaction each day or equals to a single transaction a week[6], which lower than previous reference of two transactions a week. Nevertheless, averagely, there are 0.86 transactions a day or 4.30 a week, which is higher than what is being requisite by SEC (1991).And also regarding other frequency measurement, where we found that almost three quarter of bonds traded are less than one-third of working days possible within the observed period, January 4th 2009 to March 9th 2009. Moreover, daily percentage average when bonds are traded for at least once, is only 22.12% of working days possible as long as the observed period. On the other side, quantity measurement, which is total of bonds traded each day, shows that more than 50% bonds have daily average volume of 47 bonds or more (at least IDR 470 millions at par)[7].

Average volume of bond transaction each day is IDR 10.08 billion. Comparable with transaction volume expectation of SEC (1992) as much as IDR 1-3 million equals to IDR 10-30 billion, the above average volume of bond transaction is still lying on the expectation of SEC (1992). Furthermore, standard deviation of transaction volume is IDR 45.95 billion with median IDR 2.00 billion, and modus as much as IDR 1.00 billion. As stated by Alexander, et. al. (2000:190) that this transaction volume represents wants for transaction, not only institutionally, but also

[4] We just pick the last rating position on March 2009, where this rating distribution is based on S&P convention, and thus, if there are any differences on writing (e.g. using Moody's convention), adjustment of writing will then be done in order to make sure about standardization.

[5] Assume that bonds issued by government are rated as AAA.

[6] We use convention that a week consists of 5 working days.

[7] We use standard par value, USD 1,000.00 with the exchange, USD 1 = IDR 10,000.00. This is done so that it is comparable with SEC standard. This note will be continuously used.

Table 1. Statistic descriptive of 206 bonds traded within January 4th 2009 to March 9th 2009

Sample consists of 206 bonds listed on BEI, at least within the observed period, January 4th 2009 to March 9th 2009, which issued by goverment, state-owned/local state-owned companies, and private companies. In this case, goverment issued bonds through Ministry of Finance (Departemen Keuangan RI). Average par value of outstanding bonds, total of bonds' age, maturity date, and bonds' date since issued. Bond rating use rating standard from S&P, which bonds rated by Moody's are adjusted to S&P standard. Bonds are rated since the end of March 2009 when we took data from Indonesian Stock Exchange.

Total bonds issued	206
Bonds issued	60
Bonds issued	97
Bonds issued	49
Total issuer	72
Government	1
Private Company	53
State-owned/local state-owned company	18
Average per value of outstanding bonds (in trillion IDR)	IDR. 2.28 Tril.
Average maturity date (in years)	7.13 years
Average time until maturity date (residual time), implicatly since March 6 2009 (in years)	4.25 years
Average time since issued, implicatly since March 6 2009 (in years)	2.87 years
Age since listing (after issuance)	
Listed bonds 6 months after issuance	198
Listed bonds 1 year after issuance	1
Listed bonds 2 years after issuance	0
Listed bonds more than 2 years after issuance	0
Total bonds rated at March 6 2009 (assume that sovereign bonds are rated as AAA)	
AAA	68
AA	52
A	54
BBB	17
C	2
D	6

by dealer and retail investor. For example, the above description is relatively smaller than what is found by Alexander, et. al (2000:189-190), where half of bonds have transaction volume average as much as USD 1.771 million (calculated at par value of USD 1,000.00) by using bonds sample from high yield corporate bonds. While also relatively lower than what is found by Schultz (1998) for bonds sample from corporate categorized as investment grade and high yield bonds, which is natural that institution conducting transactions in larger size than dealer or even individual investors. This research also found as Schultz (1998) stated that median of transaction volume in an institutional fixed income data pool is few times higher than equity ones, as reported by Keim and Madhavan (1995). Based on 40 stock price of companies that issue publicly traded bonds in exchange within the observed period, results that average value of equity transaction volume within the observed period is IDR 12.04 million (with standard deviation as much as IDR 37.26 million) and daily probability average of stock transaction is 64.77% of total working days.

Table 2 also indicates that there are wide variations, either in volume of transactions or average of transaction size. Average range of total bond transaction each day is between 0 – 2.64 transactions each day. Meanwhile, highest quartile of bonds traded each day is 53 bonds, and lowest quartile is 42 bonds each day. Average of transaction size also has a wide variation, which some transactions are trading more than

Tabel 2 . Descriptive Statistic Regarding Bonds' Daily Transaction Activity

	Total bond transaction for each day	Total bonds traded each day	Transaction size (in IDR billion)	Percentage of days when bonds are traded
Average	0.86	45.57	10.08	22.12%
standard deviation	(1.77)	(13.47)	(45.95)	(24.19)%
Maximum value	12.13	67	625.00	97.83%
25% highest quartile	0.65	53.00	5.00	30.43%
50% highest quartile	0.20	47.00	2.00	13.04%
75% highest quartile	0.07	42.00	1.00	4.35%
Minimum value	0.02	1.00	0.10	2.17%

Table 3. Descriptive Statistic of Daily Stock Transaction Activity of Bond Issuer Companies

Data coverage is daily volume of 39 stocks of bond issuer companies which issued and listed within January 4th 2009 to March 9th 2009. We calculate transaction size by averaging each stocks value, and then do the same thing for all stocks. Day's percentage is calculated by dividing total days when stock are traded at least once at the same day, by total working days within the observed period, which are 44 days.

	Transaction Size (in IDR million)	Percentage of same day-stock transaction
Average	12.04	64.77%
(standard deviation)	(37.26)	(38.82%)
maximum value	224.82	100.00%
25% highest quartile	8.42	100.00%
50% highest quartile	0.48	80.68%
75% highest quartile	0.01	17.61%
minimum value	0.00	0.00%

500,000 bonds per transaction (assumed in IDR 1 million par value), while some others trade less than 1,000 bonds each day. And also with the percentage of day bonds are traded, also have a wide variation, which some bonds are traded more than 90.00% of total working days while others are less than 5.00% of total working days feasible to be traded[8].

We also study total volume distribution of bonds sample in order to investigating how big the activity of bond market is handled each day and how high the possibility of total volume variability are. This is exactly as what have been done by Alexander, et. al. (2000:190) in his research of high-yield bond transaction. Figure 1 shows total daily volume distribution of market within the observed period. It can be seen that high volume is cultured within the range above 175 bonds. Around 80% of total working days when bonds are possibly traded, bond transaction volumes in IDX are over 175 bonds, while also some bonds traded less than 10% of total days, which are 25 bonds.

Transaction volumes stated on Table 2 and Figure 1 shows that higher bonds are traded each day, along with higher percentage of days when those bonds are traded for at least once a day. A little bit different result is found on Alexander, et. al. (2000:190-191) that market of high-yield bonds are relatively less liquid and characterized by sporadic transaction (see also SEC, 1991:10). He found that highest volume of transaction is within the interval of 50,000 – 150,000 bonds, which are almost 60% of total days, volumes of transaction are over 100,000 bonds.

As stated by Alexander, et. al. (2000:190-191) that appropriate way to measure volume relative to the market, which is IDX, is by comparing bonds transaction to stock's volume of transaction. We use the same market, which is IDX. This

[8] In order to calculate volume of stock transaction, we use data of daily stock transaction provided by www.finance.yahoo.com. Although there are 206 bonds listed and traded on Indonesia Stock Exchange (IDX) within period January 4th 2009 to March 9th 2009, with 71 issuer companies (state-owned/local state-owned or private companies), but there are only 39 companies which stocks are listed and publicly traded on IDX within the observed period. While the rests are private stocks.

Figure 1. Frequency Distribution of Total Daily Volume of Transaction. Data Coverage Transaction Volume of 206 Bonds Traded and Listed On IDX within the Observed Period, January 4th 2009 to March 9th 2009.

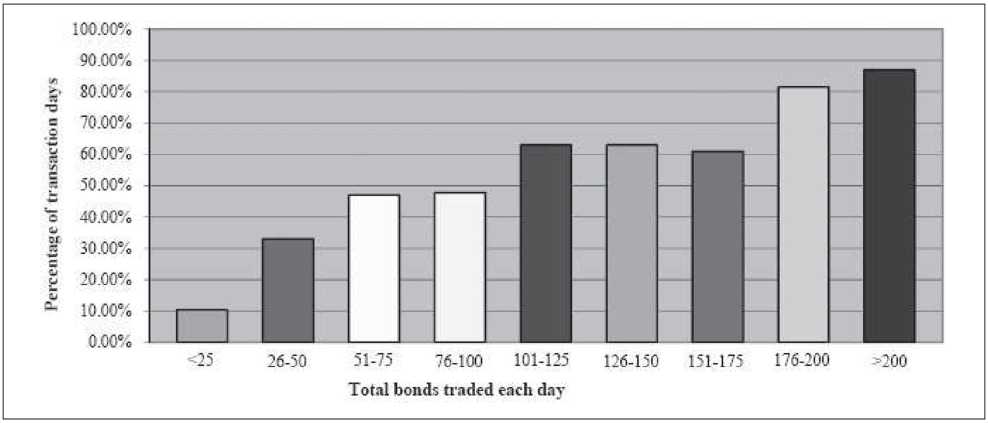

Table 4. Descriptive Comparison of Bond Volume of Transaction to Stock's Transaction

This table observed daily volume of 39 public stocks of bond issuer companies within the observed period. Average daily volume of market transaction is denominated in IDR. This data of stock transaction is obtained from www.idx.co.id. Daily average volume of each bond is reported in IDR and stated in every volume deciles value. It also shows total daily transaction of bonds and total daily bonds traded for each decile within the observed period, January 4th 2009 to March 9th 2009.

Stock Deciles Volume	Stovks' Average Daily Volume of Deciles (IDR denominated)	Total daily transaction of bonds deciles	Total daily traded bonds
1	15,156	112	7
2	64,000	141	5
3	77,609	32	2
4	247,087	39	5
5	3,087,534	52	5
6	5,366,057	62	2
7	10,731,732	88	4
8	11,211,595	76	1
9	16,259,411	50	3
10	224,817,273	121	5

observation does not meant to determine importance level relative between two markets, which are bond market and stock market. However, it might be better to provide comprehensive understanding of transaction volume of bonds. We choose to comparing volume of market value to avoid a type of comparison between "apples and oranges" which appears once other measurement of volume is used (see Alexander, et. al. (2000:191)).

Table 3 shows this comparison within the observed period[9]. To formulate standard comparison, we divide the stock's volume of transaction into ten deciles based on the average of daily transaction volumes with IDR denominated. Alexander, et. al. (2000:191) stated that it is possibly misled between transaction behavior of stock market and bond market, which stock market is often use a specialist's skill, while on contrary, bond market uses dealer in all

[9] See note 9

of its transaction[10]. Nevertheless, we don't get enough data to support their statement, and moreover, it is possible to use dealer's skill for both markets, either stocks or bonds.

Based on Table 4, the highest daily transaction volumes within the observed period are laid on deciles 2, 10 and 1 of average daily stock volume of transaction. This is also happens to the total daily traded bonds. As can be seen on the above Table 4, we found interesting behavior that more liquid stock market; more liquid bond market is, while the same thing also happens if the stock market is extremely less liquid. This is different to Alexander, et. al. (2000:192) which liquidity rate of bond market is laid on deciles 8 (for NYSE) and deciles 9 and 10 (for Nasdaq).

Table 5 shows growth statistic of bond market in IDX within the observed period, January 4th 2009 to March 9th 2009. Two daily volume measurements, which are total average transaction and total average bond traded, are reported for each observed month. Please noted that (a) data on January and February 2009 cover full normal transaction time period; (b) there are no significant changes on total bonds listed and publicly traded in IDX; and (c) data for March 2009 only covers 5 days transaction.

It can be seen from Table 5, that there is continuous decreasing of total transaction each day, begins on February 2009 to March 2009, and also with total average daily bonds traded within the same period. As has been stated above that March 2009 only covers 5 transaction days, and thus total average of daily traded bonds can't be directly compared. This follows the highest total transaction will be in the middle or at the end of the month. However, since we only focus to the average value, direct comparison cannot be implemented.

Analysis for Determinant Factors of Bond Volume of Transaction

Regression model covers data of 206 bonds within January 4th 2009 to March 9th 2009. Data period is three months (which 21 transaction days on January 2009, 20 on February, and only five transaction days on March 2009), which 206 bonds are still observed within the period, though not all of them are traded every day. Total pooled observation points are 423 points. Appropriate pooling methodology still suggests a data testing for autocorrelation, cross-sectional heteroscedasticity, and cross-sectional correlation[11]. Especially, for all version of formula (1), Ljung-Box[12] test of residual from the first OLS formula indicating an autocorrelation, which Q-statistic test result shows significance < 0.01. The same thing also valid to Q statistic testing for residual quadrate volume of the first OLS equation, which also indicates that there is a heteroscedasticity on the residual[13]. Alexander, et. al. (2000:195) explained in his observation that the appearance of autocorrelation seems to related to bonds liquidity, when these things are tend to make dealers getting easier to manage their supply (bonds), rather than if this (autocorrelation) does not exist[14].

This research will only conduct a treatment of autocorrelation and

[10] NYSE (1997:18) reported that in year 1996, specialists have conducted bid-ask transaction for 18% of all volumes of stock

[11] See Alexander, et. al. (2000) for further discussion.

[12] Ljung-Box test is used to the null hypothesis that there is no autocorrelation until lag k by using Q statistic test. Q statistic test on lag k is defined as QLB = $(n+2)\sum_{j-1}^{k}\frac{\tau_j^2}{n-k}$, which τ_j is j[th] autocorrelation and n is total observation. Q statistic test can also be used all at once, to test whether series are white noise. Further discussion regarding this matter can be seen on Ljung and Box (1979).

[13] Please look into the Appendix to see the result of autocorrelation and heteroscedasticity test.

Table 5. Growth of Bonds' Daily Transaction Volume

	Average of total bonds transaction each day (standard deviation)	Average of total bonds traded each day (standard deviation)
Jan-09	1.01	46.00
	(1.90)	(17.91)
Feb-09	0.18	45.30
	(0.60)	(9.07)
Mar-09	0.03	44.80
	(0.01)	(6.57)

heteroscedasticity in residual of the first OLS model, while all at once, only divide all observed data by the first residual model. This is a little bit different with what has been conducted by Alexander, et. al. (2000), which they conduct two adjustments as has been explained before in the research methodology. Approximation method designed by Alexander, et. al. (2000) follows Newey-West method which separately estimates autocorrelation coefficient for each bond and adjusting data which value of those autocorrelation coefficients significantly different from null.

Table 6 shows result of pooled time series and cross-sectional regression with OLS to the equation (2) which uses two measurements of transaction volume, i.e. total average of daily traded bonds and average daily transaction volume of bonds (denominated in IDR billion). Both measurements presented in two forms, i.e. its real value and also its natural logarithm. We also implement random effect testing with Hausmann testing to test the null hypothesis that there is random effect in cross sectional. Resemble result also found that, either getting random/fixed effect included to the cross sectional or not, where the Hausmann test can't reject the null hypothesis[15]. We did not test random/fixed testing to time series, as a matter of the amount of time series data is only 3 months[16].

From the above result of Hausman testing, only equation 1 [ln(transaction)] which the test result doesn't reject the null hypothesis that there is random effect, while the other three equations [transaction, ln(volume), and volume) are stated conversely. Based on this Haussman testing, we write down on Table 6 equation 1 [ln(transaction)] with the result of pooled time series and cross sectional data with random effect while the rests are without effects. We use two forms of transaction volume measurement, i.e. real value and its natural logarithm value. This is also conducted by Crabbe and Turner (1995) dan followed by Alexander, et. al. (2000), which found that the statistic result of natural logarithm of size and its own size are equals.

Table 6 also shows that model conformity between dependent and independent variables, which means the ability of independent variable to explain dependent variation, is sufficiently good. This is shown by the value of R^2 (adjusted to variable degree of freedom) is more than 75.00% (excluded model 4, which only 46.22%, although this value is acceptable for social and economic-based researches). F-test statistic value is also shows that there is a significant relationship between the independent variables and various bonds volume of transaction as its dependent, which all models are significant at level 1.00%, especially for dependent transaction and ln(volume). Moreover, there are only two independent variables, i.e. duration and price variability, which significant

[14] However, the autocorrelation test results dependency of transaction volume in current month with the previous month. This matter is not the main discussion in this research, and thus we will not getting further into it.

[15] This result also found by Alexander, et. al. (2000), which value of coefficient and t-statistic test are still the same, either using random effect or not.

[16] We also found that the result of pooled time series and cross sectional regression are the same with the result of cross sectional regression.

Table 6. Regression Result of Pooled Time Series and Cross Sectional Series of Determinant Factors of Bonds Transactions.

This table shows the result of parametric estimation of regression model with OLS of pooled time series and cross sectional data, applied to various factors which predicted ableto explain variations of bonds transaction volume, as defined below:

$$\text{Trading Volume}_{it} = \beta_0 + \beta_1 \ln(\text{Size})_{it} + \beta_2 \text{ Tenor} + \beta_3 \text{ Private Equity}_{it} + \beta_4 \text{ Credit Rating}_{it} + \beta_5 \text{ Duration}_{it} + \beta_6 \text{ Price Variability}_{it} + u_t$$

Data coverage various measurement of monthly transaction activity of 206 bonds within the observed period, January 4th 2009 to March 9th 2009. The dependent variable defined in 4 forms, i.e. (1) natural logarithm of total average of daily transaction volume within related month [ln(transaction)], (2) total average of daily transaction volume within related month (transaction), (3) natural logarithm of daily transaction volume average within related amount, denominated in IDR billion [ln(volume)], and (4) average of daily transaction volume within related month, denominated in IDR billion (volume). OLS regression model is adjusted to the possibility of autocorrelation and heteroscedasticity all at once, by dividing data with residual obtained from the first regression. Size is defined as bonds par value, denominated in IDR billion, while tenor is dummy variable which valued 1 if bonds have been traded more than 2 years, and nought in contrary. Private equity is dummy variable which will be valued 1 if bonds are issued by government or corporation (either state-owned/local state-owned company or private company), which stocks are not publicly traded and rated as B, and contrary, it will be valued as nought, if others. Duration is bonds modified duration of its salvage value until its maturity if bonds are traded at prices lower or equal with its par value. Modified duration will still be although bonds are sold higher than its par value, as long as it is not callable bonds. However, for bonds sold above its par value and are callable, the duration is measured as the same as modified duration to call. And if bonds are callable, the duration then will be the same as its effective duration. Price variability is a monthly average absolute value of daily percentage changes in volume weighted price. Note: (a) value below parenthesis is standard error, (b) token *** is significant at level 1%, (c) token ** is significant at level 5% and token * is significant at level 10%.

Independent Variable (paranthesis token)	Ln (transaction)	Transaction	Ln (volume)	Volume
Intercept	1.2945	0.4516	0.8905	0.1978
	(0.5343) **	(0.1488) ***	0.2931 ***	0.1092 *
Ln (size, denominated in IDR billion) (-)	-0.3775	-0.0526	-0.5439	-0.2754
	(0.0311) ***	(0.0073) ***	0.0262 ***	0.1189 **
Size, dummy (-)	-0.4406	-0.0822	-0.0364	-1.7166
	(0.0915) ***	(0.0081) ***	0.1015	0.6262 ***
Private equity, dummy (-)	0.6814	0.2163	3.7754	0.9436
	(0.0851) ***	(0.0195) ***	0.0917 ***	0.4018 **
Credit rating, dummy (+)	-2.5564	-0.6797	-6.6782	-7.2794
	(0.4360) ***	(0.0752) ***	0.2802 ***	2.2055 ***
Duration (+)	0.1433	0.0852	0.4283	1.7149
	(0.0297) ***	(0.0058) ***	0.0414 ***	0.3173 ***
Price variability, in % (+)	0.3474	0.1121	0.4045	0.4207
	(0.0271) ***	(0.0066) ***	0.0349 ***	0.1223 ***
R^2 (adjusted)	0.7633	0.9958	0.9511	0.4622
F-statistic	226.7825 ***	16698.230 ***	1363.4380 ***	61.1678 ***

at level 1.00% and appropriate to the expected token. While for the rests are also significant, except for model 3 [ln(volume)] at dummy variable of tenor, but with unexpected token.

Coefficient in four models are significantly shows that, *ceteris paribus,* higher par value of bonds, rarely traded they are (less liquid). This is appropriate with the fact that transaction behavior in market that ability of market to absorb bonds are depends on bond price in market, which is determined by the par value of bond itself. Hence, higher par value of bond, causes it to be less liquid. If the bonds are forced to be sold, then it is possible to be sold with relatively high discount. This invention is different with Alexander, et. al. (2000:199-200), SEC found that higher par value, positively correlated with its transaction liquidity rate.

Negative coefficient on dummy variable, tenor of bonds, also support hypothesis that bonds are tend to more actively be traded within the first two years since issued, rather than bonds with tenor is more than two years. Because, once bonds are good, then it will be absorbed into passive portfolio, as stated by Alexander, et. al. (2000). We also find other reasons that after two years traded and being known that bonds are very risky, then it will be less investor or dealer who are brave to transaction speculatively of the bonds. This is alternative reason of illiquidity bonds which has been traded for more than two years.

Positive coefficient for dummy variable of private equity on Table 6 does not supporting hypothesis that, *ceteris paribus,* bonds issued by private company are tend to be less active than bonds issued by public company. This might be caused by (1) private companies being sample of this research are sending much information than public ones, although they are private; (2) higher volume might also be a reason of bond role when this is the only way to invest on companies which stocks are not publicly traded. For equity is not available, many investors choose to invest on bonds issued by those companies rather than invest to equity of the same type of companies. This might be happen if, company's performance is good, and predicted to be steadily good or even fundamentally better. Hence, more demand of transaction by investor, which might be higher than the effect of less information given by private company, aim to higher volume of transaction for private company rather than public company.

In order to make sure that there is no perfect multicolinearity between two variables, duration and price variability, we carry out Pearson correlation test to test null hypothesis that correlation between the two variables is nought. We found that a correlation between the two independent variables is at -0.056, and thus insignificantly different from nought. Result of Pearson correlation testing is shown by Table 7. Meanwhile, a reason of using average of absolute value from daily changes percentage to the volume weighted price is to avoid possibility of heteroscedasticity, as stated by Karpoff (1987) in Alexander, et. al. (2000).

Reason alternative (3) is that bonds traded by government and state-owned/local stated-owned company, which their default risks are relatively lower than private public company, which government and some state-owned/local state-owned don't have equity that is publicly traded. Thus, investors and dealers will feel more secure to conduct transaction speculatively with bonds issued by private company. This is might be caused by although bonds are bought, those bonds are not liquid anymore, investors still have assurance to have its coupon (if any) paid and its principal when mature (assumed to be guaranteed by government).

Each control variable shows behavior as has been hypothesized, except for dummy variable of credit rating. Not only interest rate risk (duration) and variability/volatility of price seems to be as a determinant of volume speculative component of bonds transaction. For duration, positive coefficient which significant in regression model either with dependent variable of transaction volume (natural logarithm or even its real value) or transaction volume (natural logarithm or even its real value) are tend to confirming that transaction volume can also reflecting interest rate risk. This

Table 7. Result of Correlation Testing to Two Variables; Duration and Price Variability.

		DURATION	VARIABILITY
DURATION	Pearson Correlation	1	-0.056
	Sig. (2-tailed)		0.249
	N	423	421
VARIABILITY	Pearson Correlation	-.056	1
	Sig. (2-tailed)	0.249	
	N	421	612

invention is resembled to Alexander, et. al. (2000), except for duration variable, which in fact has negative token, is different with what they hypothesize. Meanwhile, if prices are not too sensitive to interest rate changes, then transaction volume should also not too sensitive to the interest rate risk. As stated by Alexander, et. al. (2000).

Earlier researcher hypothesized that bonds with higher default rating (which ex ante for rating C or lower) are tend to have higher volume of transaction. As stated before that better bonds are, which A-rated or higher, higher probability they are to be absorbed by passive portfolio. Nevertheless, bonds which rating is closer to default will be less liquid. Moreover, these bonds are prone to be avoided by investor to be bought, although by speculative trading. Hence, it is proper if the dummy variable coefficient of credit rating has negative token.

Conclusion

We observe bonds volume of transaction and various implications to its liquidity. Result of some prior researches did not support the influence of size (par value) of bonds and tenor to its liquidity. Nevertheless, this research carries out a result that higher size (par value) of bonds, longer outstanding time of it since issued (tenor of bonds), and thus follow to seldom traded, which finally affect to less liquid those bonds are.

We also studied that the activity of bond secondary market is also affected by equity status of company which issue bonds. Our invention shows that bonds of private company are tend to be more active rather than public company ones. This is converse to the hypothesis that bonds of private company should be less liquid for its regulation regarding information disclosure is more flexible than public company regulations are. We presume that this might be endorsed by the fact that bonds are the only way to invest to the company, which do not have stocks publicly traded. This can be understood if investors know that current and forecasted performance of private company are fundamentally good. Thus, successor research is needed to explore this substitution effect furthermore.

With many inventions, this research is then expected to give a part of contributions to academician in order to develop pricing methodology of bonds, which appropriate to the market condition of bond market in Indonesia. Inference analyses of various external factors which influence bond yield spread, add an empirical-based literature to the testing of various determinant factors as one measurement of bonds. Liquidity is a typical component in yield spread, while to the practitioners, results from this research are hopefully able to be used as a basis of decision making related to bonds, either in pricing, risk mitigating or even valuation of portfolio performance in general.

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