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The Market Maker

-What impact does a market maker have on stock turnover?

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Abstract

This study will measure the effect a market maker has on stock turnover. Our results have been run through a regression analysis. The results from the regression analysis were statistically significant from zero, but the results was not satisfying thus the increase was fairly small. Due this problem, we compared the relationship between the stock turnover and index turnover before and after the market maker and found that the market maker has a statistically significant effect on stock turnover with 6,2%.

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2. Introduction

2.1 Purpose

The purpose of this study is to strengthen earlier studies made on market maker's effect on stock liquidity. A number of previous studies have used bid-ask spread as a proxy for stock liquidity but there are a few that have used turnover as a proxy.

The second purpose for this study is that several earlier studies have shown that increased liquidity leads to an increased Cumulative Abnormal Return (CAR), meaning that investors can expect a higher return if an illiquid stock becomes liquid. This may be due to market maker introduction, analyst coverage and other various factors.

This study will show why an introduction is beneficial to investors and the companies that use the market makers services.

2.2 Background

2.2.1 Stock liquidity

The general definition of liquidity of a stock is that a liquid stock can be sold or bought with low transaction costs.

A stock with a large spread between the bid and ask price, is seen by the market as an illiquid stock. The buyer or seller must match the other ones price, which would not be a problem if the spread was low. When we have large spreads that are several percent higher or lower than the initial bid/ask price, it can result in a high transaction cost. Transaction costs are defined as all costs other than the money price that occur when trading a good or service (Johnson, 2005).

There are also other aspects of liquidity such as the order depth. Order depth is defined as the volume of both the bid and ask side. If a stock has high order depth, a single investor or trader cannot have a significant effect on the stock price by trading large volumes. A high order depth means that investors can trade stocks without taking on liquidity risk and by being able to make transactions at the price they expect. A liquid stock can absorb volumes of trades without a significant effect on the price level of the stock. Therefore, to describe the meaning of stock liquidity, it is not sufficient to only measure the bid-ask spread which is widely used in studies, for example by Amihud and Mendelson (1986).

Black (1971) gives four conditions to hold in order for a stock to be liquid:

1) There are always bid and ask prices for the investor who wants to buy or sell small amounts of stock immediately.

2) The spread between the bid and ask prices is always small.

3) An investor who is buying or selling a large amount of stock, in the absence of special information, can expect to do so over a long period of time at a price not very different, on average, from the current market price.

4) An investor can buy or sell a large block of a stock immediately at a premium or discount that depends on the size of the block. The larger the block, the larger the premium or discount.

Kyle (1985) discussed the meaning of liquidity where he split the definition into three parts.

1) *Tightness:* The cost of turning around a position over a short period of time. The transaction cost is as discussed earlier.

2) *Depth:* If the depth is high, large volumes will not move the price level significantly.

3) *Resiliency:* The speed with which prices tend to converge towards the underlying liquidation value of the commodity, the speed with which prices recover from a random, uninformative shock.

To conclude Black (1971) and Kyle (1985), the view on liquidity can be seen as:

- The transaction can be done despite illiquidity in terms of large bid-ask spreads, but with a larger transaction cost.
- The transaction cannot be done at all since the volume in the order depth is insufficient in terms of not affecting the price significantly.
- Part of the transaction can be done because of insufficient order depth.

2.2.2 Asset Pricing

Chan, Hong and Subrahmanya (2008) argued that the price of a financial asset can vary in different markets even though the cash flows are similar and/or identical. Amihud and Mendelson (1986) argued that increased stock liquidity, with bid-ask spread as a proxy for stock liquidity, would increase the value of the firm. Their study also demonstrated a correlation between asset value and liquidity and showed that minimizing the illiquidity would result in a higher asset value. The authors also argued that investors would demand a higher risk-premium if the stock was illiquid.

Brennan and Subramayna (1996) investigated the empirical relation between monthly stock returns and measures of illiquidity, and found a significant relation. Datar, Naik and Radcliffe (1998) found a negative correlation between stock returns and their turnover and confirmed that illiquid stocks provide higher average returns. Chordia, Subrahmanyam and Anshuman (2001) used trading activity (trading volume and turnover) as a proxy for liquidity, and found that liquidity variability is related to stock return.

2.2.3 Market Maker

A market maker is a company with the objective to continuously quote prices that will lead to an increased volume and provide improvement in trading quality of illiquid stocks for the companies that employ the market marker. It is the market makers task to ensure the company that the gap between the bid and ask price will be a minimum of four percent for their stock, based on the ask price (NASDAQ OMX). This can differ depending on the contractual agreement signed between the company and the market maker (Anand, Tanggaard and Weaver, 2005), meaning that companies can pay a larger fee in order to have smaller gap in the spread.

Pratt (1989) found that market discounts on illiquid stocks could be as high as 30%, making it a factor in valuing a stock. Demetz (1968) argued that there was a problem due to the lack of immediacy in the exchange of stock. The problem occurred when the arrival of buyers and sellers was not perfectly synchronized. He further argued that a market maker could be used to correct the imbalances and solve this problem.

NASDAQ OMX Stockholm allowed the publically traded companies to introduce a market maker in 2002 with the implementation taking place in 2003. Prior to that, the companies on the stock market could do not affect the liquidity of their stock. There are certain criteria that need to be achieved by a market maker wanting to contract with a company. These requirements are set by NASDAQ OMX Stockholm.

Table 1. Minimum requirements for the market makers contracted by public companies.

Spread	Market depth	Time
Maximum of 4% calculated on the ask side	Minimum four trading lots on both the bid and ask side	Prices must be quoted at least 85% of the trading day and be present in both continuous trading and in the closing auction

The table above shows the market makers minimum requirements in order to be able to work as a market maker. Once a market maker fulfills these requirements, they can enter a contractual agreement with a publically listed company. An agreement between the company and the market maker is not restricted to just these requirements .

A company has the right to enter into a voluntary contractual agreement with a market maker of their choice. The contract between the market maker and the company may be terminated at any time, as long as the contract terms and conditions allow them to do so.

The market maker charges the company a fee for this service. Kehr, Krahnen and Theissen (2001) show that the market maker has no real profit from continuously quoting prices and their only compensation comes from the fees paid to them by the companies using their services.

2.2.4 Previous Research

Anand, Tanggaard and Weaver (2005) studied the impact a market maker would have on the market quality and asset pricing. They measured market quality in form of volatility, spreads and depth.

The study examined a sample of 50 illiquid firms that contracted a market maker between September 2002 and March 2004 and were listed on the NASDAQ Nordic OMX Stockholm (previously Stockholm Stock Exchange). Their result demonstrated that the spread narrowed by a statistically significant amount and that depth increased following the implementation of a market maker.

Furthermore, the paper also demonstrated a significant increase in average trade size meaning that there was no need for traders to split their orders in order to maintain a low market depth. Anand, Tanggaard and Weaver (2005) also found that trading activity increased following the introduction of a market maker. In addition, their result found a statistically significant decrease in return volatility. The decreased return volatility was visible following the introduction of a market making service for both intra-day and inter-day return volatility.

The authors also examined and demonstrated that average cumulative abnormal return (CAR) was statistically significant with a 6.19% increase for the first ten days after the implementation of a market maker. Anand, Tanggaard and Weaver (2005) argued that there was a relation between CAR and spread improvement, and that CAR was not caused by a market wide trend. The authors also analysed the market makers and found that they do not benefit from trading profits. They concluded that firms with low liquidity may benefit from contracting a market maker.

Ingemarsson and Kozlowski (2005) analysed the introduction of a market maker on the NASDAQ OMX Stockholm. They performed an event study and analysed the short-term impact on asset pricing after the introduction of a market maker. Their empirical result showed a statistically significant increase in stock price for the first two days and that liquidity proxies like spread and market depth improved after the introduction of a market maker. These results support the result from the study conducted by Anand, Tanggaard and Weaver in 2005.

Landgren and Sjöblom (2007) also analysed the introduction of a market maker, additionally they also studied the termination of a market maker.

Their data was a sample of 95 stocks, listed on the NASDAQ Nordic OMX Stockholm and First North, which had contracted a market maker, where 17 of the companies had a market maker but terminated the service at some point before the contract length had ended. The data sample covered the span between 2002 and 2007. Their result demonstrated that a market maker have an impact to improve market quality by decreased transaction cost associated with trading activities.

They also argued that improved market quality would lead to an increase in stock price. Their results found a statistically significant short run positive abnormal return of 7.07% and an average abnormal return of 7.30% for the most illiquid stocks. Furthermore they argued that market quality and trading activity remained unchanged after the removal of a market maker.

Nimalendran and Petrella (2002) studied the impact a market maker had on the market quality on the Italian Stock Exchange in 1997. Their empirical result demonstrated that a hybrid order driven system affect the market quality in a positive manner in contrast to the pure order driven structure.

The market maker also had a relation to improvements in several quality metrics such as trading activity, volume turnover, bid-ask spread, depth, depth-to-spread ratio and adverse selection costs. They also concluded that these benefits were greater for illiquid stocks.

Their results also support the findings by Chung, Van Ness, and Van Ness (1999) that analysed the market-making process with participation of limit-order traders and market makers. Chung, Van Ness, and Van Ness (1999) found evidence that market maker provided stock liquidity to low volume stock, traded by limit-order traders. Their findings also support findings by Grossman and Miller (1988) who argued that market makers provide liquidity to illiquid stocks.

Kehr, Krahnen and Theissen (2005) studied the market maker function and the effect their participation had on the market. The study analysed and provided a detailed analysis of the call auction procedure on the Frankfurt Stock Exchange. The authors argued that the market makers participation provided a valuable service to the market.

Their result showed that a market maker may accommodate order imbalances, increase market liquidity and stabilize stock prices. By eliminating the trades made by the market maker and obtain a price without their participation, the authors found that market maker participation tends to reduce return volatility (Kehr, Krahnen and Theissen (2005).

Mann, Venkataraman and Waisburd (2002) analysed companies both with and without assistance of a market maker on the Paris Bourse. The data sample covered a span between 1995 and 1998 when a new market making system was introduced.

The authors argued that less liquid stocks would have a statistically significant increase in the price following the introduction of a designated market maker. An event study was performed where the authors found a significant abnormal return of approximately 4% for illiquid stocks.

2.2.5 Institutional background

The NASDAQ OMX is a global stock exchange with operations in 24 markets. The markets in our study are the NASDAQ OMX Stockholm, NASDAQ OMX First North and Aktietorget.

Aktietorget is only active in Sweden where they focus on growing and developing companies. They have companies listed with a market value from ten million SEK to one billion SEK.

2.2.5.1 NASDAQ OMX Stockholm

NASDAQ OMX Stockholm is a part of the NASDAQ OMX Group. The stock exchange has approximately 310 companies listed in three sectors. The sectors are:

- *Large Cap:* Companies with a market value over one billion euros.
- *Mid Cap:* Companies with a market value between 150 million euros and one billion euros.
- *Small Cap:* Companies with a market value below 150 million euros.

The company uses an electronic platform called INET, which is up to five times faster than the previous platform, SAXESS. The reason for the change of the platform is that it would result in improved efficiency, shorter response time and an increased flow (NASDAQ OMX).

In an interview in 2010 with Erik Thedéen, CEO of NASDAQ OMX Stockholm, he told Nyhetsbyrån Direkt that the turnover speed would possibly increase 20-25 percent in the upcoming years, new participants would enter the market, resulting in an increase in the liquidity in the stock market (Nyhetsbyrån, 2010-02-05).

At the NASDAQ OMX Nordic, it is possible to trade in equities, premium bonds, warrants, depository receipts and convertibles. They are all traded through the INET platform.

The Stockholm Stock Exchange allowed firms to contract with market makers in order to improve their liquidity in 2002. The company set minimum requirements for the market makers, which we have described in the market maker section.

2.2.5.2 NASDAQ OMX First North

First North is a Multilateral Trading Facility (MTF) where the regulation is not as strict and complex as for a stock exchange, such as the NASDAQ OMX Stockholm. This means that companies listed on First North does not have the same rules and regulations to follow as a company listed on the stock exchange, making the First North more suitable for smaller and developing companies. But since there are not the same regulations for a MTF as there are for a stock exchange, it involves a higher risk for investors.

2.2.5.3 Aktietorget

Aktietorget is similar to First North. They have companies listed that are in their growing phase. It is a MTF market place with approximately 125 companies listed. Aktietorget is only active in Sweden with Swedish companies and they use the same platform as NASDAQ OMX.

3. Method

3.1 Guidance

We have chosen to conduct a research on the effect a market maker has on the turnover of a stock. We will do so by choosing a number of companies that have used or currently using a market maker and compare their turnover, which will act as our proxy for stock liquidity. We will conduct a research by comparing the stocks liquidity before and after the market maker introduction.

We know that the role of the market maker is to continuously quote prices for a stock and therefore create a counterpart for the other buyers and sellers. We have made a search on the different markets available to us and we have not found any companies on the Large Cap list that uses the services of a market maker. We narrowed our search for companies that have used or currently using market makers to the remaining four groups, Mid Cap, Small Cap, First North and Aktietorget.

3.2 Research approach

We have used a hypothesis and alternative hypothesis where we base them on previous research. We have run it through a panel data regression analysis of the random effects in order to determine if our hypothesis is statistically significant. This study has a quantitative research approach where we use secondary data, collected from NASDAQ and Aktietorget's database.

3.3 Reliability

Our study differs from previous studies because we have used a different proxy for liquidity in our research. Other studies in this field have used a different proxy and therefore measured the market maker impact on other variable such as the bid-ask spread.

We must receive our results in a statistically significant level on at least 95% in order to determine if our study is reliable. The reason for 95% is that it is used by previous researchers in this field. A higher level would make the result harder to interpret.

4. Data

In order to come to a conclusion for our research question, we have collected data from companies that did not have a market maker for at least 20 trading days before the market makers introduction. Otherwise we would have run the risk of including companies that have just changed their market maker and that would influence our results reliability.

4.1 Data Collection

The collected data consisted of 36 companies listed on Nasdaq OMX Nordic Exchange (15), Aktietorget (9) and Nasdaq OMX First North (12). All of our data has been collected from the OMX Group's and Aktietorget's websites. The market makers introduction dates have been retrieved from press releases and other announcements.

The data we have collected covers the stocks daily turnover measured in total SEK, the daily market value for each company (SEK) and the daily turnover (SEK) for the index the stock is listed on.

The event study covered a total of 40 trading day observations for each of the 36 companies where we have collected 20 trading days prior to the market makers introduction ("the pre-period") and 20 trading days after the market makers introduction, including the first day with the market maker ("the post-period").

The period we have chosen to study ranges from 2006 to 2011. The 36 companies have 33 different market maker introduction dates with a total of 5 different market makers.

Our initial list of companies with market makers was bigger but was shortened because of four reasons:

1) Many companies did not send out a press release and announce that they had hired a market maker, which meant that we could not obtain the introduction date for the market maker.
2) A few companies did announce that they had hired a market maker, but not the introduction date.
3) Companies hired a market maker along with their introduction on the stock exchange so we could not obtain a pre-period for the stock.
4) Companies might have changed market maker and signed a contract with a new market maker, that would leave us without a pre-period.

The turnover for the index used was from Aktietorget Index, OMX Stockholm Small Cap PI, OMX Stockholm Mid Cap PI and First North All-Share SEK, depending on which of these the stock was listed on. Since we have used specific lists and not just used OMX Stockholm PI for all 36 stocks, we have minimized the risk that index turnover would have any effect on our study since we used it as control variable in the regression analysis.

The second control variable we have used is the market value of the company. These two factors, as mentioned earlier in our paper, affect the stock liquidity (Cheng, 2007).

The data consisted of 1440 observations (36 companies x 40 trading days). Since the dispersion of market maker introduction dates (33) is satisfying, spread over the five-year period (2006-2011) we have not chosen to use a control sample.

We believe that any market wide factors (e.g. financial crises, seasonal effects etc.) have not had a significant impact on our result.

4.2 Limitations

As mentioned earlier, we were forced to narrow down our list to 36 companies. This could have a possible effect on our result. Another issue that could affect the results is that some firms may already have informal contracts with financial institutions resembling the formal contract with the market maker. The last variable is the contract signed between the market marker and the company which may differ depending on the contracts.

4.3 Regression analysis

Panel data regression analysis, also known as cross-sectional time-series, has multiple entities. Each of these entities has repeated measurements at different time periods on one or more variables (Park, 2009;Bruderi, 2005). Implementing the method into our study meant that we had 36 different companies (cross-sectional units) on three different variables, namely IndexTurnOver, MarketValue and DummyVariable(0/1).

We have used two time periods. In each time period we had 20 observations per stock which represented the 20 days before and after the introduction. This meant that we had a total of 36 companies x 20 daily observations x two time periods = 1440 observations.

If we were to put all data together and not separate these companies with both time-series and cross-sectional parts, we could have run a regression using ordinary least squares (OLS). This type of regression would be easier to run but would be a subject to many types of errors.

We separated time and cross-sectional parts of the data to receive a more accurate result. The reason for using panel data are that our companies can affect the dependent variable but also the time (pre or post period) can affect it. Random effect has been used because we think that the different companies may have a random effect on the result.

5. Models

We present our hypothesis on the effect a market maker has on stock liquidity and the panel data regression equation that we have used in order to determine if there was a positive correlation between a market makers introduction and stock liquidity in terms of stock turnover.

5.1 Hypothesis

The following hypothesis is used in order to evaluate and analyze the effects a market maker has on stock liquidity:

H_0 *: The introduction of a market maker has a positive effect on stock liquidity.*

This is tested against the alternative hypothesis:

$H_{1:}$ *The introduction of a market has no effect on stock liquidity.*

We used random effect panel regression for our study. In our regression analysis, two control variables were used. This was to eliminate two factors that may affect the stock liquidity. Cheng (2007) analyzed what factors affect the stock liquidity. The author argued that firm size and the stock market it is traded on are positively related to stock liquidity.

Therefore we used the following regression equation:

$$StockTurnOver_{i,t} = \alpha + \beta_1 IndexTurnOver_{i,t} + \beta_2 MarketValue_{i,t} + \beta_3 Dummy_{i,t} + \varepsilon_{i,t}$$

Where $StockTurnOver_{i,t}$ is the turnover for firm i (36 companies) during period t (pre and post-period).

$IndexTurnOver_{i,t}$ is the turnover for the index for firm i during period t.

$MarketValue_{i,t}$ is the market value for firm i during period t.

$Dummy_{i,t}$ is a dummy variable assigned the value 0 for the pre-period and the value 1 for the post-period.

α is a constant variable (the intercept) and $\varepsilon_{i,t}$ is the "noise" term reflecting other factors affecting stock turnover

6. Results & Analysis

We have run our data using the statistics program STATA. In order to solve the problem of the different dates and other variables, we were forced to take the natural logarithm of the variables in our analysis (see appendix).

We have found that the market maker has a statistically significant effect on stock turnover but this was a small increase on the stock turnover. The R-squared for all independent variables effect on the dependent stock turnover variable is 32,5%. This was below our expectation since we thought that our variables would have a larger effect on the stock turnover. Another surprising result was that the coefficient for the dummy variable, i.e. the market maker, was quite small.

Table 2. Results from regression analysis

RANDOM EFFECTS

No. Of Observations	1440
No. Of Groups	36
R-Square:	
Within:	0.0121
Between:	0.5717
Overall:	0.3263

Stock Turnover(ln)	Coefficient	Standard Error
Market Maker	**284.4524**	**78.5566**
Market Value (ln)	**729.4173**	**131.9675**
Index Turnover (ln)	**-6828.313**	**726.749**

Our result was affected by the fact that several observations had a value of zero. These result are subject to differences due to the data, one such example might be that we did not divide the companies into different sub-samples depending on how liquid the companies were. Another approach would have been to use companies from one list, but this was difficult due to the lack of data as we have described in the data section where we presented our criteria for the data collection.

We could have received a different result if we would have had a larger amount of companies in our data. One of the reasons of our study is that we have chosen to use stock turnover as a proxy instead of bid-ask spread which has been used in several previous studies.

We have found that the introduction of a market maker, on average, affects the stock turnover by 284 SEK per company as the table above shows. This means that the total stock turnover for each company increases by 284 SEK based on the 36 companies that we have used as a basis for our data.

This is the only effect that we can see with the introduction of a market maker on the stock turnover. It can be discussed if this is a large enough effect to be interesting for the parties involved, such as investors and the companies that use the market makers service.

Table 3. Mean for the relationship between stock turnover for each company and index turnover for the pre- and post-period. The mean and median are then subtracted with 1 to receive the percentage change.

Mean	4,572359026	3,572359026
Median	1,062238688	0,062238688
Standard Deviation		14,42642961
T-STATISTIC (MEAN)		0,041271
0.95 t-quartile 35 degrees of freedom		2,030107928

Our mean is calculated by dividing the post index/stock turnover relationship with the pre index/stock turnover relationship. The results from Table 3 are a simple student's t-test. As we can see in the value for t-distribution we have 0,041271, whereas 2,0301 is the critical value for 95 % significant test of 35 degrees of freedom. We can conclude that our result is not of significant value.

Table 4. Wilcoxon Signed rank test for median on a 95% confidence interval.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of Kvot_1 equals 0.00.	One-Sample Wilcoxon Signed Rank Test	,038	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Because of the construction of the test we have assigned the null hypothesis the value 0 for the median. This means that the market maker does not have any effect on the stock turnover. The relation measured here is the same as above with the mean value. As we can see in Table 4, the Wilcoxon test confirms that we should reject the null hypothesis on a 95% significance level. Therefore we can conclude that the median is separated from 0 on a significant level on 95%, which means that the market maker has an effect on stock turnover with 6,2%.

7. Conclusion

The coefficient for the dummy variable in our result has shown that the introduction of a market maker had a statistically significant effect on the stock turnover. However, when we did the Wilcoxon test, we received some interesting results. We can conclude that the market maker has an effect on stock turnover with 6,2%.

We can also conclude that the market maker, along with company market value and index turnover, are not the only variables that effects stock turnover since there are other variables that we have not considered in our study, as we can see in the R-Squared. These could be analyst coverage, stock listing, stock exchange, owner concentration etc.

The results from the student t-test were not satisfying in order to determine that the market maker has an effect on stock turnover, in terms of the mean value.

It is important to understand that market makers main objective is to quote bid and ask prices so the risk for investors is minimized since they are trying to buy and sell the stock with a minimal transaction cost. It does not necessarily mean that investors would be more interested in the stock and therefore increase their trading activity.

8. Further research

We think that further research can be done in the field, mainly by including more variables in the regression analysis. We can broaden our data by including more companies and expanding the event study from 20 days prior and 20 days after the market maker introduction. The next logical step in our research is to see what effect the termination of the contract between the company and the market maker, will the effect of the market maker on the liquidity remain after the termination of the market maker. Is it worth having a market maker if there is no long term positive effect for the company?

It would also be interesting to take this type of study to a market place with a larger turnover, we have used the Stockholm Stock Exchange as a basis for our data and going back five years to find data which is a rather small exchange compared to London or New York.

We could only find 36 companies that used or use a market maker and where we actually have a date for the introduction. If one were to make a similar study on a bigger market place with a larger amount of companies, it would be an interesting study and perhaps with a different result. The basis for further research are in place with articles written in this area, the need is to continue the research by broadening the data with larger market places to investigate and see if the same result hold when more companies are involved.

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10.Appendix

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Random-effects GLS regression                   Number of obs      =      1238
Group variable: ind                             Number of groups   =        36

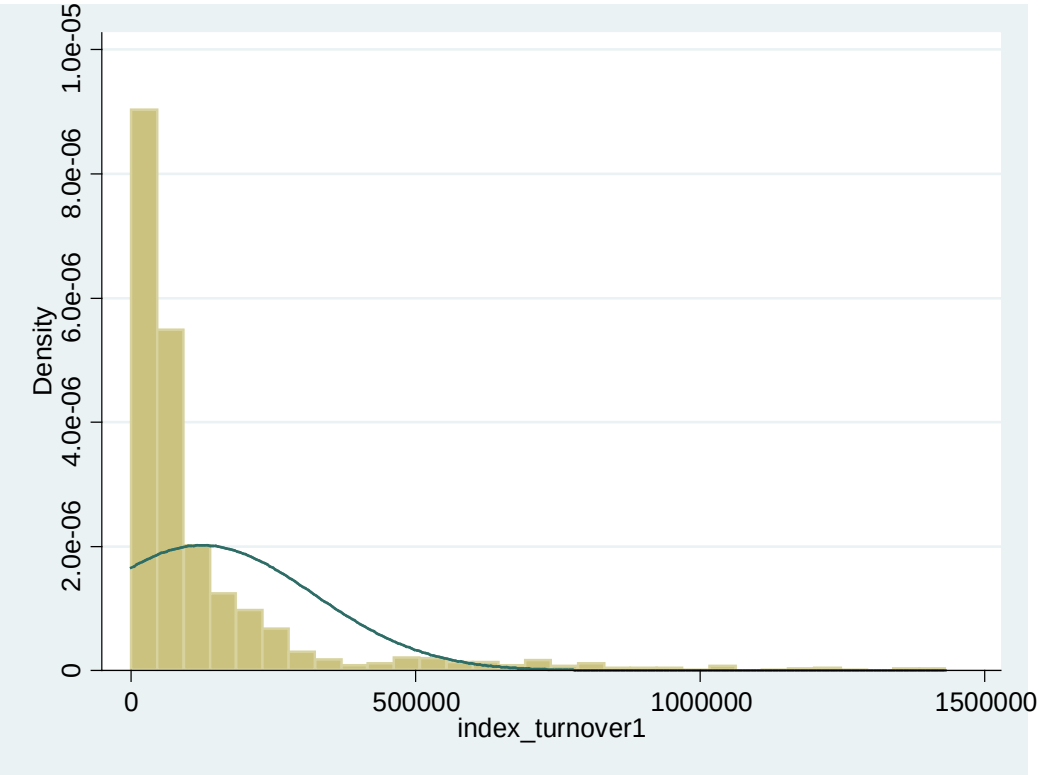
R-sq:  within  = 0.0121                         Obs per group: min =        18
       between = 0.5717                                        avg =      34.4
       overall = 0.3263                                        max =        40

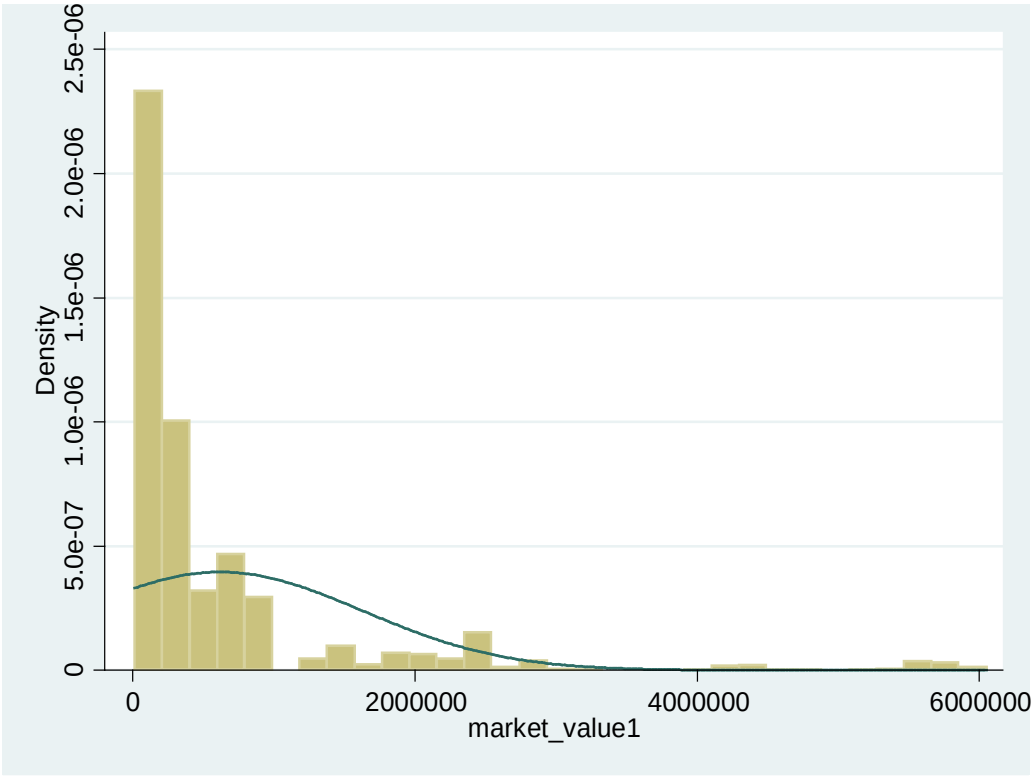
                                                Wald chi2(3)       =     58.74
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

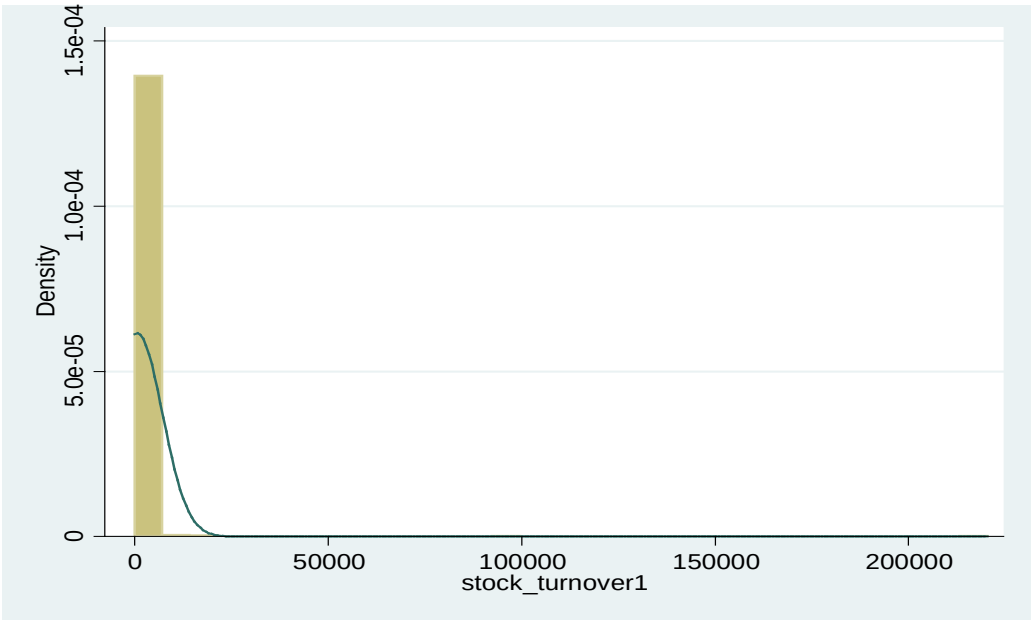
lnstock_tu~r	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dummy	.2844524	.0785566	3.62	0.000	.1304844	.4384205
lnmarket_v~e	.7294173	.1319675	5.53	0.000	.4707657	.9880689
lnindex_tu~r	.2097428	.0726749	2.89	0.004	.0673026	.352183
_cons	-6.828313	2.587541	-2.64	0.008	-11.8998	-1.756827
sigma_u	1.140117					
sigma_e	1.363012					
rho	.41165397	(fraction of variance due to u_i)				

Our result as seen in STATA, Note that we have scaled the data so every result needs to be multiplied by 1000.

The Tables below show the twisted nature of our data, this shows why we were forced to include the natural logarithm as we ran our data through the STATA software:




Density
0
5.0e-07
1.0e-06
1.5e-06
2.0e-06
2.5e-06
0
2000000
4000000
6000000
market_value1


Density
0
5.0e-05
1.0e-04
1.5e-04
0
50000
100000
150000
200000
stock_turnover1