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Is Temporary Trading Halt Mechanism for New Shares on The First Day of Trading Conducive to Curbing Speculations?

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Abstract

IPO underpricing as well as speculation on the first day of trading is a worldwide phenomenon. In order to curb IPO speculation risks, Shenzhen Stock Exchange makes an attempt to directly restrain price volatility and turnover rate through the Temporary Trading Halt Mechanism. This paper employs Rubin Causal Model and Genetic Matching method to evaluate and analyze real effects of the Mechanism. Empirical results show that, although it lowers the first-day turnover rate, the mechanism does push up first-day returns and first-day Price-to-Earning ratio. In fact, it keeps the closing price stay in a relatively high level, but is helpless for curbing risks.

Keywords: Temporary Trading Halt Mechanism for IPOs on the First Day of Trading, Matching Method, Rubin Causal Inference

Introduction

In China, speculative trading about newly listed shares is a typical drinking-game in which thousands of irrational investors may ignore stock fundamentals and follow suit to participate in the hype, and the finale is being hung up for a long time and suffering great losses. According to the statistics of Financial Innovation Laboratory of Shenzhen Stock Exchange, 497 of 583 newly listed shares between the beginning of 2010 and the end of February 2012, especially for 33 of 34 newly listings, whose first-day returns exceed 100%, have fallen below the first-day closing price, with an average drop of 23.15% and the maximum decline even outpaces 64.4%. The loss percent of individual investors in whose account the amount is less than 100 thousand yuan reaches up to 60.75%.

Since the launch of Small-and-Medium Enterprise Board, especially for the beginning of IPO System Reform, Shenzhen Stock Exchange (SZSE) has committed to explore the effective ways of refraining speculation. During the initiation of Growth Enterprise Market, SZSE made a first trial about *the Temporary Trading Halt Mechanism for Newly-listed Shares during First-day Trading*, and punished 9 short-term speculative accounts, who frequently partook in the hype, by restricting free transactions. In the wake of the effects of IPO System Reform gradually emerging, pricing in primary market becomes more and more reasonable; meanwhile, newly listed shares speculations in secondary market get to intensify once again. From the middle of February, 2012, the returns of 8 IPOs on the first-day of trading expands significantly, with an average rise of 62.65%, and over 60% shares' first-day returns growth outpaces 50%, including 3 shares whose rises even exceed 80%.

In order to take precautions against the risk of newly listed shares on the first-day of trading as well as cooperate with IPO System Reform, SZSE made a bold move which stressed direct executive interference on IPO shares' first day performance and released "*Notice on Further Optimizing the Temporary Trading Halt Mechanism for Newly-listed Shares during First-day Trading*" (the Notice), highlighting the role of Trading Halt Mechanisms. Although SZSE has rolled out a series of new supporting measures for IPO reform, analysts still insist that these probably encourage speculations and bring individual investors more risks.

Among copious literature relevant to IPO underpricing not many researches pay enough attention to IPOs first-day risk management. Ruud (1993) investigates the distribution of initial returns following IPOs and find a partially unobserved left tail effect. Ruud believes underwriter price support may account for the skewed distribution and challenges the presumption that IPO underpricing is deliberate. According to his logic, any IPO regulatory initiatives aimed at eliminate premium is redundant. Pettway and Kaneko (1996) explore the linkage between the change of IPO pricing regimes and new shares initial returns. They find that the price limits remove and auction mechanism introduction significantly reduce initial returns. Thus, risk management about initial returns may rely on market-oriented reforms. Krigman, Shaw and Womack (1999) show that IPO flipping is predictable and underwriters' pricing errors are intentional. Thus, rational pricing is the very solution to restrain the risk of first-day flipping. Kao, Wu and Yang (2009) examine two sets of IPO regulatory initiatives, pricing regulations and penalty regulations and find pricing regulations may induce firms to manipulate pricing-period earnings thus negatively influence the post-IPO performance

whereas penalty regulations prevent firms from over-optimism about earnings forecast thus have positive impacts. Song, Tan and Yi (2014) evaluate the relative importance of IPO underpricing and overvaluation and find that overvaluation has more explanatory power on initial return. Its implication lies in what the regulatory commission should do is to reduce overvaluation but not to overly depend on controlling secondary market performance.

In this paper, we focus on testing the real effects of the Notice which in fact sets a limitation for the price volatility of newly listed shares, and explore whether this measure lowers the risks or not. To the best of our knowledge, this is the first attempt to quantify the impacts of price control on the secondary market performance of IPOs during the first day of trading. Our findings not only provide guidance for deepening China's IPO System Reform, but also provide a reference for other countries. The structure of this article is as follows: section 2 briefly reviews the attempts of SZSE in coordination with IPO System Reform; section 3 describes data and econometric methodology; section 4 explains empirical results, and section 5 makes a concluding remark.

Attempts in Coordination with IPO System Reform in China

On 25th May, 2012, three shares landed on Small-and-Medium Enterprise Board which commenced the implementation of new IPO rules. The new rules bring three changes: increasing the allotment for institutional investors in off-line offering; removing the requirement for three-month lock-up; allowing new shares acquired on the first trading day to freely float. In order to propel reform, new IPO rules are also absorbed into *Management Measures for Securities Issuance and Underwriting* amended in line with the *China Securities Regulatory Commission Guidelines for Further Deepening IPO Reform* (the Guidelines). In response to changes in new shares issuance management, SZSE releases three follow-up measures aimed at curbing first-day speculation, inducing rational pricing and maintaining orders during the first-day transaction of newly-listed shares.

First, SZSE releases "*Notice on further Optimizing the Temporary Trading Halt Mechanism for Newly-listed Shares during First-day Trading*", which highlights the role of the trading halt mechanisms. In order to curb newly listed shares speculation, SZSE released "*First-day Temporary Trading Halt System for IPO Shares*" on 8th March, 2012. Some positive results emerged after that. First-day closing prices of 45 IPOs listed on SZSE since then has risen only 21.82% on average, which is obviously lower than previous. In response to the public concerns over shortened trading time for hot IPO shares on their first trading day, SZSE reformulated the trading halt triggering criterion based on the percent of price volatility and turnover ratio. This adjustment is part of the consistent effort to explore and optimize the existing trading halt mechanism through sound appraisal and extensive public consultation. The Notice further refines the system. First, according to the measure, a new price volatility criterion of 20% above or below the opening price is set to be a trigger: (1) If price fluctuation during intraday trading reaches or exceeds 10% above or below the opening price for the first time, trading will be suspended for one hour and risk alert of possible speculation will be issued to investors. If price fluctuation during intraday trading reaches or exceeds 20% above or below the opening price for the first time, trading will be suspended until 2:57

p.m., the time that closing auction begins; (2) If turnover rate reaches or exceeds 50% during intraday trading, trading will be suspended for one hour.

Second, SZSE releases guidelines to enhance regulation over the trading of newly-listed shares. *Guidelines for Monitoring Abnormal Trading Behaviors in Periods Immediately after Listing* (*draft*) covers many new points: specifying explicit definitions of abnormal trading behaviors on first-day and subsequent trading; clarifying specific regulatory measures to enhance transparency of SZSE's regulations and procedures; offering evaluation and corresponding monitoring standards for member firms' performance in managing their clients' behaviors in the transaction about newly-listed shares.

Third, SZSE provides further guidance for investors rationally participating in IPOs and urges members to intensify the efforts of investor suitability management. By drawing on the experience of investor suitability management on the ChiNext market, SZSE emphasizes risk alerts and education and requires institution members to help raise their clients' awareness of compliance during their participation in IPOs trading as well as further enhance self-regulatory mechanism.

In general, two notable measures may significantly influence the first-day transaction. First, under the new scheme, transactions about newly-listed shares will be halted for one hour if the price volatility relative to the opening price by as much as 10% during its first trading day. Meanwhile, the status of trading halt until the last 3 minutes before closing will take effect if the price deviates over 20% from the opening price. Second, transactions will also be halted for one hour if the turnover ratio exceeds 50% on the first day. Obviously, the distinctive characteristic of temporal trading halt system is that it is a non-market intervention means. In the view of SZSE, it is necessary for an immature market even though not everyone believes so. However, numerous analysts insist that although being given high expectation the trading halt mechanism actually loosen the regulation about speculation due to the fact that speculators are able to manipulate trading with fewer funds under this mechanism. Thus, it is helpless for risk control.

Data and Methodology

Data

We aim at quantifying the effect of temporary trading halt mechanism on the performance of first-day trading. Data about 51 newly-listed shares upon SZSE during 1st January, 2012 and 11th May, 2012 (including 19 shares issued before the implementation of temporary trading halt mechanism and 32 ones issued after that) have been selected for empirical research. We focus on this period for two reasons: the primary one is to keep other impact factors invariant as far as possible meanwhile eliminating the influence of market trends, thus 1st January, 2012 has been choose as the beginning; the other is that since the end of May 2012, IPO in Chinese domestic stock market has been paused temporarily waiting for further reform deepening. All data come from CSMAR database.

In the process of policy effect assessment and comparative analysis, one of the most considerable issues is to figure out how the same share will perform during the first day of

trading without temporary trading halt mechanism? It involves the comparison between observational and potential outcomes. Except in the realm of science fiction, where parallel universes are sometimes imagined to be observable, it is impossible to measure causal effects at the individual level. In essence, causal inference is a missing value issue. We resort to Rubin Causal Inference Model and Matching Method.

Rubin Causal Inference Model

The Rubin causal model conceptualizes causal inference in terms of potential outcomes under treatment and control, only one of which is observed for each unit (Rubin 1990). A causal effect is defined as the difference between an observed outcome and its counterfactual.

Let Y_{i1} denote the potential outcome for newly-listed share i if its first trading day is after the release of the Notice, and Y_{i0} denote the potential outcome for i if its opening transaction is before the release of the Notice. The treatment effect for i is defined by $\tau_i = Y_{i1} - Y_{i0}$. Causal inference is a missing data problem because Y_{i1} and Y_{i0} are never both observed. In principle, if assignment to treatment is randomized, causal inference is straightforward, while, in our observational setting, covariates are almost never balanced across treatment group, in which members are newly-listed after the release of the Notice and thus subject to the temporary trading halt mechanism, and control groups, in which shares are newly-listed before the release of the Notice and thus independent of its regulation, because they are not ordinarily drawn from the same population. Thus, a common quantity of interest is the average treatment effect for the treated (*ATET*):

$$\tau\left|\left(T=1\right)=E\left(Y_{i1}\right|T_i=1\right)-E\left(Y_{i0}\right|T_i=1\right) \tag{1}$$

where T_i is a treatment indicator who equals to 1 when i is newly-listed after the release of the Notice and 0 otherwise.

Equation 1 cannot be directly estimated because Y_{i0} is not observable for the treated. Thus, we assume that selection into treatment depends on observable covariates X. Following Rosenbaum and Rubin (1983), conditional on X, treatment assignment is unconfounded ($\{Y_0, Y_1 \perp T\}|X$) and there is overlap: $0<Pr(T=1|X)<1$. Together, they constitute the property of strong ignorability of treatment assignment. For *ATET*, the unconfoundedness assumption can be weakened to mean independence: $E(Y_{ij}|T_i,X_i)=E(Y_{ij}|X_i)$, and meanwhile the support of X for the treated be a subset of the support of X for control observations is an enough shortcutting for overlap assumption. By conditioning on observed covariates X, treatment and control groups are exchangeable. Then the *ATET* can be estimated as

$$\tau\left|\left(T=1\right)=E\left\{E\left(Y_i\right|X_i,T_i=1\right)-E\left(Y_i\right|X_i,T_i=1\right)\left|T_i=1\right\}\right. \tag{2}$$

where the outer expectation is taken over the distribution of $X_i|(T_i=1)$ which is the distribution of baseline variables in the treated group.

When estimating causal effects using observational data, it is desirable to replicate a

randomized experiment as closely as possible by obtaining treated and control groups with similar covariate distributions. This goal can often be achieved by choosing well-matched samples of the original treated and control groups, thereby reducing bias due to the covariates. The most straightforward and nonparametric way to condition on X is to exactly match on the covariates, however it usually fails in finite samples if the dimensionality of X is large. Two other commonly used approaches are propensity score matching and multivariate matching based on Mahalanobis distance. A significant shortcoming of them is that they may (and in practice, frequently do) make balance worse across measured potential confounders (Sekhon, 2011). Diamond and Sekhon (2013) propose a matching algorithm, genetic matching, that maximizes the balance of observed covariates between treated and control groups. It is a generalization of propensity score and Mahalanobis distance matching. The algorithm is nonparametric and does not depend on knowing or estimating the propensity score.

Genetic Matching

The idea underlying genetic matching method is that if Mahalanobis distance is not optimal for achieving balance in a given dataset, one should be able to search over the space of distance metrics and find something better. If one has a good propensity score model, it should be included as one of the covariates. Under this circumstance, both propensity score matching and Mahalanobis matching can be considered special cases of genetic matching.

Genetic matching is an affinely invariant matching algorithm using the distance measure $d()$, in which all elements of W are zero except down the main diagonal.

$$d\left(X_i, X_j\right) = \left\{\left(X_i - X_j\right)' \left(S^{-1/2}\right)' W S^{-1/2} \left(X_i - X_j\right)\right\}^{1/2} \tag{3}$$

where W is a $k \times k$ positive definite weight matrix and $S^{1/2}$ is the Cholesky decomposition of S which is the variance-covariance matrix of X.

Setting the non-diagonal elements of W to zero aims at enhancing computational power, and meanwhile many loss criteria can be used to choose the free elements of W.

Genetic matching method attempts to minimize a measure of the maximum observed discrepancy between the matched treated and control covariates at every iteration of optimization. Unlike traditional matching methods, genetic matching reliably reduces both the bias and the mean squared error of the estimated causal effect even when the propensity score is incorrectly specified and the covariates are not ellipsoidally distributed (as is almost always the case in applied work) as long as the selection on observables assumption holds. Evenly when the covariates are ellipsoidally distributed and the propensity score is correctly specified, in finite samples, estimates based on genetic matching have lower mean squared error than those based on the usual matching methods such as propensity score matching (Diamond and Sekhon, 2013).

Empirical Results

The phenomenon of high first-day returns of IPO shares in China has drawn lots of attention for a long time. Dozens of news reports, specialist interviews has dedicated to this topic. High first-day return is not only a speculation phenomenon in an immature market, but also a signal which implies that there are severe problems in current new shares pricing system. The temporary trading halt mechanism is no other than a trial to curb speculative transaction.

Matching

The key concept in determining which covariates to include in the matching process is that of strong ignorability. To satisfy the assumption, it is important to include all variables known to be related to both treatment assignment and the outcome. Generally poor performance is found of methods that use a relatively small set of "predictors of convenience" (Shadish, Clark and Steiner, 2008). Including variables that are actually unassociated with the outcome can yield slight increases in variance. However, excluding a potentially important confounder can be very costly in terms of increased bias. Thus, it should be liberal to include variables that may be associated with treatment assignment and/or the outcomes. Meanwhile, one type of variable that should not be included in the matching process is any variable that may have been affected by the treatment of interest.

In China, under the approval system, China Securities Regulatory Commission controls the scale and pace of new share issue through checking submitted shares' price, quantity and time to market. New share issue price is always built on price-earning ratio. Reasonable price-earning ratio and issuance quantity are two key points of getting issuance approval. Considering these, we decide to take five variables: *Expected Fully Diluted Price Earning Ratio*, *Fully Diluted Price Earning Ratio*, *Offering Qquantity*, *Issuance Quantity*, *Circulation Quantity*, as covariates to do the genetic matching. The full output is included in Appendix. As shown in the Appendix, the smallest p value across all of the variables after matching is 0.2356 compared with the pre-matching value of 0.0998. Apparently, genetic matching improve the balance across covariates. The balance is excellent for all variables.

The Impact of First-day Temporary Trading Halt Mechanism

Not that we have achieved excellent balance, we can examine our estimate of the treatment effect and its standard error. In this paper, we focus on three aspects about new shares performance: first-day market-adjusted returns, first-day turnover rate and first-day price-earning (PE) ratio. All resutls are presented in the Table.

First-day Market-adjusted Returns. The estimate of the treatment effect for the treated about the first-day market-adjusted returns ($ATET_{MAReturns}$) is 4.79% with a Abadie-Imbens standard error of 0.0209. The average treatment effect about first-day market-adjusted returns ($ATE_{MAReturns}$) is 9.71% with a standard error of 0.0449. Both of them are significant at 5 percent significant level.

First-day Turnover Rate. The estimate of the treatment effect for the treated about the first-day turnover rate ($ATET_{TORate}$) is -21.85% with a Abadie-Imbens standard error of

0.0906. The estimate of the treatment effect about first-day turnover rate (ATE_{TORate}) is -21.03% with a standard error of 0.0897. Also, both the $ATET_{TORate}$ and ATE_{TORate} are significant at 5 percent significant level.

First-day Price-earning Ratio. The estimate of the treatment effect for the treated about the first-day PE ratio ($ATET_{PERatio}$) is 10.04 with a Abadie-Imbens standard error of 2.6952. The estimate of the treatment effect about the first-day PE ratio ($ATE_{PERatio}$) is 9.93 with a standard error of 2.5873. Both the $ATET_{TORate}$ and ATE_{TORate} are significantly different from 0 at 1 percent significant level.

Table 1. The real effects of temporary trading halt mechanism

	Impact Direction	ATET	ATE
First-day Market-adjusted Returns	+	4.79%**	9.71%**
		(0.0209)	(0.0449)
First-day Turnover Rate	−	-21.85%**	-21.03%**
		(0.0906)	(0.0897)
First-day Price-earning Ratio	+	10.04***	9.93***
		(2.6952)	(2.5873)

Note: Numbers in the brackets are Abadie-Imbens standard errors. ** and *** represent being different from 0 at 5% and 1% significant level, respectively. "+" means the temporary trading halt mechanism makes the dependent variables increase and "-" means decrease. On average, SZSE's First-day Temporary Trading Halt Mechanism for New Shares pushes up individuals' first-day market-adjusted returns and their first-day PE ratio whereas lower down first-day turnover rate.

Empirical results show that the first-day temporary trading halt mechanism for IPO shares has positive impacts on first-day returns and first-day PE ratio as well as a negative impact on first-day turnover rate, which means the initiatives that SZSE made about curbing IPO speculation in fact do not push up the first-day price but also limit the transaction meanwhile.

Concluding Remarks

The direct purpose of first-day temporary trading halt mechanism for IPO shares is to curb the speculative transaction that unsuccessful subscribers have high inclinations to involve in. Moreover, its deeper motivation lies in coordinating with the improvement of IPO pricing mechanism as well as narrowing down the spread between primary and secondary market. It is, in essence, a transitional supporting measure. In fact, under current circumstances, the dilemma of stock market segmentation between primary and secondary market in China is still serious. IPO usually descends to the tunnel of profit transferring. Restrictions about trading performance in secondary market without breaking the ice of segmentation are unable to solve the problem of IPO underpricing and first-day speculation.

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References

Abadie, A., & Imbens, G. (2006). Large Sample Properties of Matching Estimators for Average Treatment Effects. *Econometrica*, *74*, 235-267. http://dx.doi.org/10.1111/j.1468-0262.2006.00655.x

Diamond, A., & Sekhon, J.S. (2013). Genetic Matching for Estimating Causal Effects: A General Multivariate Matching Method for Achieving Balance in Observational Studies, *Review of Economics and Statistics*, *95*, 932-945. http://dx.doi.org/10.1162/REST_a_00318

Jennifer L. Kao, Donghui Wu, & Zhifeng Yang (2009). Regulations, Earnings Management, and Post-IPO Performance: the Chinese Evidence. *Journal of Banking and Finance*, *33*, 63-76. http://dx.doi.org/10.1016/j.jbankfin.2007.03.016

Judith S. Ruud (1993). Underwriter Price Support and the IPO Underpricing Puzzle. *Journal of Financial Economics*, *34*, 135-151. http://dx.doi.org/10.1016/0304-405X(93)90015-4

Laurie Krigman, Wayne H. Shaw, & Kent L. Womack (1999). The Persistence of IPO Mispricing and the Predictive Power of Flipping. *Journal of Finance*, LIV, *3*, 1015-1043.

Richard H. Pettway, & Takashi Kaneko. (1996). The Effects of Removing Price Limits and Introducing Auctions upon Short-term IPO Returns: the Case of Japanese IPOs. *Pacific-Basin Finance Journal*, *4*, 241-258. http://dx.doi.org/10.1016/0927-538X(96)00013-3

Rosenbaum, P.R., & Rubin, D.B. (1985). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*, *70*, 41-45. http://dx.doi.org/10.1016/j.cjar.2013.12.001

Rubin, D.B. (1990). Comment: Neyman (1923) and Causal Inference in Experiments and Observational Studies. *Statistical Science*, Vol. 5, 472-480.

Sekhon, J.S. (2011). Multivariate and Propensity Score Matching Software with Automated Balance Optimization: The Matching Package for R. *Journal of Statistical Software*, *42*(7).

Shunlin Song, Jinsong Tan, Yang Yi (2004). IPO Initial Returns in China: Underpricing or Overvaluation? *China Journal of Accounting Research*, *7*, 31-49. http://dx.doi.org/10.1016/j.cjar.2013.12.001

William R. Shadish, M. H. Clark and Peter M. Steiner. Can Nonrandomized Experiments Yield Accurate Answers? A randomized Experiment Comparing Random and Nonrandom Assignments. *Journal of the American Statistical Association, 103*(484), 1334-1343. http://dx.doi.org/10.1198/016214508000000733

Appendix

The full output of matching is as follows:

***** (V1) Expected Fully Diluted Price Earning Ratio *****

	Before Matching	After Matching
mean treatment.....	23.2380	23.2380
mean control.....	26.5210	23.2330
std mean diff.....	-58.0450	0.0920
mean raw eQQ diff.....	3.5811	0.9252
med raw eQQ diff.....	2.1100	0.7200
max raw eQQ diff.....	23.0600	3.1800
mean eCDF diff.....	0.1028	0.0443
med eCDF diff.....	0.0905	0.0400
max eCDF diff.....	0.2611	0.1600
var ratio (Tr/Co).....	0.2794	0.9535
T-test p-value.....	0.2356	0.9836
KS Bootstrap p-value.	0.3230	0.8510
KS Naive p-value.....	0.4537	0.9062
KS Statistic.....	0.2611	0.1600

***** (V2) Fully Diluted Price Earning Ratio *****

	Before Matching	After Matching
mean treatment.....	30.8900	30.8900
mean control.....	34.7260	30.3300
std mean diff.....	-49.8980	7.2907
mean raw eQQ diff.....	4.3337	1.4132
med raw eQQ diff.....	2.3800	0.9600
max raw eQQ diff.....	30.7400	5.6800
mean eCDF diff.....	0.0901	0.0457
med eCDF diff.....	0.0779	0.0400
max eCDF diff.....	0.2463	0.1600
var ratio (Tr/Co).....	0.2843	0.2843
T-test p-value.....	0.1652	0.3027
KS Bootstrap p-value.	0.3900	0.8500
KS Naive p-value.....	0.5291	0.9062
KS Statistic.....	0.2463	0.1600

***** (V3) *Offering Qquantity* *****

	Before Matching	After Matching
mean treatment.....	2808.5	2808.5
mean control.....	2500.9	2582.7
std mean diff.....	20.816	15.282
mean raw eQQ diff.....	378.16	249.16
med raw eQQ diff.....	200	160
max raw eQQ diff.....	3400	1500

mean eCDF diff.....	0.0524	0.0515
med eCDF diff.....	0.0463	0.0400
max eCDF diff.....	0.1811	0.1600
var ratio (Tr/Co).....	2.2794	1.3164
T-test p-value.....	0.0998	0.5919
KS Bootstrap p-value..	.7030	0.8270
KS Naive p-value.....	0.8710	0.9062
KS Statistic.....	0.1811	0.1600

***** (V4) *Issuance Quantity* *****

	Before Matching	After Matching
mean treatment.....	2808.5	2808.5
mean control.....	2500.9	2582.7
std mean diff.....	20.816	15.282
mean raw eQQ diff.....	378.16	249.16
med raw eQQ diff.....	200	160
max raw eQQ diff.....	3400	1500
mean eCDF diff.....	0.0524	0.0515
med eCDF diff.....	0.0400	0.0463
max eCDF diff.....	0.1600	0.1811
var ratio (Tr/Co).....	2.2794	1.3164
T-test p-value.....	0.0998	0.5919
KS Bootstrap p-value..	0.7030	0.8270
KS Naive p-value.....	0.8710	0.9062
KS Statistic.....	0.1811	0.1600

***** (V5) *Circulation Quantity* *****

	Before Matching	After Matching
mean treatment.....	2249.6	2249.6
mean control.....	2068.4	2005.2
std mean diff.....	15.304	20.648
mean raw eQQ diff.....	302.98	198.11
med raw eQQ diff.....	164	128
max raw eQQ diff.....	2700	1200
mean eCDF diff.....	0.0519	0.0507
med eCDF diff.....	0.0484	0.0400
max eCDF diff.....	0.1811	0.1600
var ratio (Tr/Co).....	2.2602	1.3189
T-test p-value.....	0.1010	0.5911
KS Bootstrap p-value..	0.7090	0.8280
KS Naive p-value.....	0.8710	0.9062
KS Statistic.....	0.1811	0.1600

Before Matching Minimum p.value: 0.0998

After Matching Minimum p.value: 0.2356