EXHIBIT 10

(Part 1 of 3)

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

In re: **BERNARD L. MADOFF INVESTMENT SECURITIES LLC,** **Debtor,**	**Adv. Pro. No. 08-01789 (BRL)** **SIPA LIQUIDATION** **(Substantively Consolidated)** **Adv. Pro. No. 10-5287 (BRL)**
IRVING H. PICARD, Trustee for the Liquidation of Bernard L. Madoff Investment Securities LLC, **Plaintiff,** **v.** **SAUL B. KATZ, et al.,** **Defendants.**	**11-CV-03605 (JSR) (HBP)**

Bruce Dubinsky Deposition Binder

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Part II of III

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Market Efficiency and Returns from Convertible Bond Hedging and Arbitrage Strategies

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Convertible bonds (CBs), which can be converted into a firm's stock at a specified price during a given period, have become increasingly popular financing instruments. New issues can be consummated rapidly since they tend to be marketed via conference calls rather than road shows. Furthermore, the execution risk, from exposure to random price changes as a consequence of the time required to execute an order, is limited. CBs can also be flexible tools for balance sheet management since coupons and conversion prices can be tailored to the issuer's needs. Additional features can also be included in convertible bond issues in order to meet issuer's needs as well as investors' needs. Ostensibly, the option features will permit the firm to enjoy lower interest costs relative to straight debt. However, accountants and rating agencies treat convertible bonds as debt.[1] On the other hand, it is argued that convertible bonds are issued by firms with speculative-grade ratings that could not raise capital either by issuing equity or straight debt. The implication of this is that convertible bonds are likely to be issued by firms that are smaller and riskier.

Arshanapalli, Fabozzi, Switzer, and Gosselin [2005] perform an event study for firms listed on either the NYSE, NASDAQ, or AMEX that issued convertible bonds during the period 1993 to 2001 and find significant negative cumulative abnormal returns of –2.19% over the period from two days before to two days after the issuance of convertible bonds for their sample of firms. The event study on the announcement dates shows significant negative cumulative abnormal returns of around –3% over the interval beginning from the day before the announcement to the end of the announcement day. The results are consistent with Dann and Mikkelson [1984] and Davidson, Glascock, and Schwartz [1995], which show negative impacts of convertible issues for earlier time periods. Hence, over the past three decades, the empirical evidence suggests that convertible bond issuance has an adverse impact on the issuer's stock, owing to dilution effects and/or adverse information effects that overwhelm agency and tax benefit effects.

This empirical regularity, coupled with the claim that the underlying convertible bond prices change in a disproportional sense relative to the stocks,[2] has given rise to an industry of convertible arbitrage hedge funds, which purportedly exploit returns' predictability inefficiencies.[3] According to Evans [2002], hedge funds purchased nearly 70% of all new CB issues in 2001. Atlas [2005] notes that hedge funds account for more than 75% of the daily trading in CBs.

Trading by hedge funds may affect the profitability of outright short-selling strategies, as well as convertible arbitrage strategies.[4]

Whether such short-selling coupled with long positions in the convertible bonds is consistently profitable and a violation of market efficiency in a returns predictability sense is an empirical matter that we propose to test.[5]

In particular, in this article, we examine a large set of trading strategies related to CBs to test for abnormal returns for several trading strategies, including various approaches for testing other forms of fixed income arbitrage. As a first step, we examine the naked long position of CBs/underlying stocks and the sensitivity of convertible returns to various risk factors. Second, we test for efficiency based on deviations from the "law of one price" using relative returns of different combinations of long CBs with short positions in underlying stocks, which include equal money positions, delta-neutral positions, and bearish/bullish gamma positions. We also study the robustness of the various trading strategies to transaction costs, leverage effects, and alternative parameter inputs.

In addition, we test for efficiency from the perspective of the pricing of comparable CBs, as a further test of the "law of one price" for securities that are close substitutes. In particular, we examine the trading profits of buying the relatively "cheap" CBs and short-selling the expensive ones, using the criteria of the implied volatility difference as well as the abnormal credit spread difference of CBs issued by the same firms.

We also test strategies of buying comparably cheap financial instruments and selling expensive ones using portfolios that comprise CBs versus call options or other corporate bonds of the same issuer. Finally, because a large portion of CBs issued in the U.S. are categorized as junk bonds (i.e., have high credit risk), we also look at the performance of portfolios of CBs that are combined with credit default swaps (CDS) to ameliorate credit risk.

DATA DESCRIPTION

The sample consists of all CB offerings over the period January 1, 1990, to December 31, 2006, for which the underlying shares are traded on either the New York Stock Exchange (NYSE), the American Exchange (AMEX), or the over-the-counter (NASDAQ) market from the SDC Platinum database. Since we focus on trading/hedging strategies that can actually be implemented, to ameliorate potential liquidity constraints, we require that the proceeds amount plus the over-allotment sold in the hosted market of the convertible bonds be in excess of $100 million. There are no upper limits on the outstanding amount. The sample includes both coupon and zero-coupon bonds.

The basic CB data, including conversion price, coupon rate, expiry date, issuance date, ratings, and issue size are obtained from SDC. Missing observations from SDC are replaced with data from the convertible bond database that was provided to us by Morgan Stanley. The time series of CB prices are obtained from DataStream. We focus on the returns and hedging strategies from the four-year period from the issuance date to four years after the issuance. The CB prices include both on-the-run and off-the-run observations. Hence, the results should be relatively free of survival bias. The issuance date of a CB refers to the first trading date after the issuance of the CB. The CB prices are quoted as "clean" prices (i.e., they do not include accrued interest). Accrued interest is added to these prices in order to calculate holding period returns. Stock returns are obtained from CRSP. Benchmark interest rates, such as Treasury bills and bonds of different maturities, and CDS spreads are obtained from Datastream. The CDS spreads are the average of 3-year CDS bid and ask spreads. The ratings for the corporate bonds are from Moody's. Other corporate bond prices and yields of the same issuers during the observation period were retrieved from TRACE (Trade Reporting and Compliance Engine). The yield of different bonds of the same issuer could differ greatly because of different ratings. For each issuer, we designate the corporate bond with the highest (lowest) yield over time as the high (low) yield bond.

The historical option prices of the same issuers during the observation period are obtained from Ivy DB Option Metrics. For each observation, we retrieve the information on date, expiry date, strike prices, and best bid/ask prices. The option prices used in the analyses are calculated as the average of the best bid and best ask prices. We match the issuer, and strike price and expiry date to identify the most comparable option to the CBs.

The final sample consists of 125 CB issuances over the period January 1990 to December 2006. A breakdown of the sample by year of issuance is shown in Exhibit 1. The study period includes both bullish and bearish equity market periods. The average principal amount is highest in 2000, coincident with the peak of the high-tech market. Since the early 1990s, conversion premia have increased, reflecting higher volatility

EXHIBIT 1
Distribution of Convertible Bond Issuance by Year

Year	Number of Issues	Coupon (%)		Principal Amount (Million USD)		Conversion Premium (%)	
		Mean	Median	Mean	Median	Mean	Median
1990	6	N/A	N/A	433.67	425.00	15.50	14.50
1991	9	N/A	N/A	449.78	400.00	15.55	14.26
1992	10	4.46	4.75	326.50	112.50	20.79	21.84
1993	10	3.09	4.69	422.00	262.50	22.69	20.01
1994	4	5.25	6.25	356.25	250.00	54.31	23.38
1996	1	5.00	5.00	500.00	500.00	26.44	26.44
1997	1	6.00	6.00	90.00	90.00	25.01	25.01
2000	3	N/A	N/A	2299.20	2712.50	31.26	26.78
2001	22	1.72	0.00	788.08	525.00	55.20	28.74
2002	5	3.90	4.50	1156.00	1000.00	30.02	32.08
2003	14	2.97	2.81	679.02	287.50	37.54	35.25
2004	11	2.69	2.00	342.27	300.00	39.43	40.00
2005	11	4.14	3.88	453.65	275.10	25.58	28.00
2006	18	2.50	2.50	362.50	320.00	26.23	27.49
Total	125						

Note: This exhibit reports the yearly characteristics of convertible bond issues used in the study. To ensure liquidity, an issue is included only if its proceeds amount plus the over-allotment sold in the hosted market of the convertible bonds exceeds $100 million. The coupon rates in 1990, 1991, and 2000 in this sample are the floating interest rate.

and/or a tilt in preferences towards issues with more pure debt-like structures.

METHODOLOGY

Our approach is to subject CBs and portfolios that comprise CBs, including various hedged portfolios, to a battery of tests for abnormal returns/deviations from the "law of one price." The returns of CBs include the variation of the market prices, to which we add the daily accrued coupon rates. The underlying stock returns include dividends. Interest opportunity costs are considered only in the zero initial self-capital investment trading strategies. The yield of the Moody's Aaa corporate bond at the time of the trading is the proxy for the cost of borrowing,[6] while the 10-year Treasury bond rate is the proxy for the lending rate.

There are two types of returns: buy-and-hold returns and rebalanced returns. Reinvestment of the gains/losses are only considered for the latter. We carry out the simulations for up to four years following the first trading date when data are available. The simulated returns are not annualized except in the option hedge strategy. Tests of significance are based on using standard *t*-statistics.

THE RETURN CHARACTERISTICS OF PURE LONG CBs/UNDERLYING STOCKS

As background to analyzing various CB portfolio trading strategies, in this section, we look at the behavior of CB returns. The returns are calculated based on the purchase of a CB or its underlying stock position at the issuance date. The simulated portfolio consists of all 125 firms included in the sample. Exhibit 2 shows the average (non-annualized) returns of a pure long CBs portfolio over various holding periods relative to the issuance date.

EXHIBIT 2

Returns of Long Convertible Bonds from Issuance Date

Months	Returns	*t*-value	Positive	Negative	Total	Significance
1	0.36%	0.61	75	49	124	0
2	0.50%	0.58	66	55	121	0
3	-0.14%	-0.14	59	61	120	0
4	0.14%	0.12	60	58	118	0
5	0.76%	0.48	63	54	117	0
6	1.82%	1.21	66	49	115	0
7	3.61%	2.00	67	46	113	2
8	5.91%	2.90	65	45	110	3
9	8.04%	3.66	68	39	107	3
10	9.10%	3.93	69	37	106	3
11	9.61%	3.97	68	37	105	3
12	11.39%	4.52	69	33	102	3
13	10.85%	4.13	67	32	99	3
14	10.60%	4.13	65	31	96	3
15	11.06%	4.27	66	31	97	3
16	13.41%	4.88	70	25	95	3
17	14.84%	4.71	69	26	95	3
18	17.82%	4.17	68	26	94	3
19	18.08%	3.61	67	25	92	3
20	17.39%	4.14	69	21	90	3
21	17.00%	4.58	75	15	90	3
22	17.94%	4.71	72	16	88	3
23	19.44%	5.69	74	14	88	3
24	23.64%	5.33	73	13	86	3
25	24.90%	5.25	71	13	84	3
26	25.19%	5.20	70	13	83	3
27	26.40%	5.31	70	10	80	3
28	26.45%	5.47	69	12	81	3
29	26.65%	5.56	68	12	80	3
30	28.99%	5.32	68	11	79	3
31	31.60%	5.69	70	8	78	3
32	32.57%	6.34	67	9	76	3
33	34.93%	6.92	67	7	74	3
34	38.40%	6.97	67	6	73	3
35	36.93%	6.62	61	8	69	3
36	37.26%	6.37	59	4	63	3
37	37.05%	5.88	55	5	60	3
38	36.80%	5.62	53	5	58	3
39	39.08%	5.78	53	4	57	3
40	40.67%	5.88	53	4	57	3
41	41.69%	5.92	52	5	57	3
42	42.78%	5.96	48	5	53	3
43	41.98%	5.73	44	4	48	3
44	42.00%	5.44	42	4	46	3
45	42.72%	5.22	41	4	45	3
46	37.22%	5.53	40	3	43	3
47	37.96%	5.45	37	4	41	3
48	31.21%	4.36	21	5	26	3

Note: This exhibit reports the average buy-and-hold returns of buying one convertible bond at the issuance date. The first column indicates the holding period. The second column reports the returns of the pure long CBs portfolio; t-statistics for the returns are shown in Column 3. Column 4 (5) is the number of positive (negative) returns; Column 6 is the total number of observations at the end of X months after the issuance date. Column 7 is the significance level of the t-statistics in Column 3: 1, 2, and 3 denote statistical significance at the 10%, 5%, and 1% levels in a two-tail test, respectively.

It is interesting to note that the returns from the early months subsequent to the issuance are insignificantly different from zero. However, they become significantly positive from the seventh month after the issuance and onwards; they reach their peak value during the fourth year.

Exhibit 3 looks at the extent to which these returns can be explained by equity market risk, interest rate risk, and credit risk.[7] We use the S&P 500 Index return as the proxy for equity market risk.[8] Interest rate risk is determined as the term spread, calculated as the difference between the rate of the 3-month Treasury bill and 6-month Treasury bill.[9] The difference between the average of Aaa utility and Aaa industrial bond rates and the average of Baa utility and Baa industrial bond rates is the proxy for credit risk that we employ.

The impact of the three risk factors on the CB holding period return series is assessed using random component panel data regressions. Panel A of Exhibit 3 provides estimates that are based on the complete sample; Panel B shows the results for CBs with a Moody's rating of B or lower. We note that for all firms in the sample, CB returns display significant equity risk and interest rate risk components. Somewhat intuitively, we note that these two risk components as well as credit risk are reflected in the return series for low-rated firms. These findings can shed some light on investing in different subgroups of CBs in different scenarios.

Exhibit 4 reports the average returns of buying the underlying shares of the CBs from the issuance date of the CBs. For all the firms in the sample, the underlying stock performance is negative over the six-month period subsequent to a new issue of CBs. This is consistent with the aforementioned literature demonstrating poor stock market performance in the aftermath of new CB issues.

Exhibit 5 depicts the average volatility from the first trading date after the issuance of CBs. Panel A shows the behavior of the daily rolling normalized volatility of returns. Normalized daily volatility is defined as the daily volatility on day D (calculated as the volatility of the logarithmic returns from D – 240 (240 trading days before D) to D – 1 (one trading day before D) divided by the volatility in the first trading date after the issuance. It is evident that there is a U-shape to the normalized volatility series, with volatility declining until 3.05 years after the issuance date and then rising thereafter. Panel B shows normalized quarterly volatility, with two alternative normalizations: 1) based on the volatility relative to the first quarter before the issuance; 2) based on the volatility of the first quarter after the issuance as well as after we calculate the volatility in a different way—as the volatility of the logarithmic returns in that quarter. The quarterly volatility series also show a general declining pattern for the three years subsequent to the issuance, irrespective of the normalization volatility measure.

Exhibit 6 provides an assessment of equity market risk, interest rate risk, and credit risk on the returns of the underlying shares, using random effects panel data regressions. The results contrast somewhat with those of Exhibit 3. In particular, as might be expected, unlike the bond series, interest rate risk is not reflected in the underlying share returns for the sample of firms with Moody's ratings of B or lower; however interest rate risk exists in the complete sample. On the other hand, similar to the results reported in Exhibit 3, credit risk is reflected in the equity return series, both for the

EXHIBIT 3
Risk Components of Pure Long Convertible Bonds Returns

Panel A. All Firms

Independent Variable	Coefficient	*t*-Value
Constant	–0.0001	–0.192
Equity Risk	0.298	10.591***
Interest Rate Risk	0.344	4.496***
Credit Risk	0.013	0.321
F-statistic	75.3***	

Panel B. Low-rating Firms (B or Lower)

Independent Variable	Coefficient	*t*-Value
Constant	–0.001	0.801
Equity Risk	1.047	8.256***
Interest Rate Risk	0.700	2.287**
Credit Risk	0.273	1.978**
F-Statistic	34.5***	

*Note: Random effect panel data regressions of CB holding returns on equity market risk, interest rate risk, and credit risk. The independent variables are 1) S&P 500 return; 2) the term spread, calculated as the difference between the rate of the 3-month Treasury bill and 6-month Treasury bill; 3) the difference between the average of Aaa utility and Aaa industrial bond rates and the average of Baa utility and Baa industrial bond rates (as the proxy of the credit risk). Panel A includes all the observations in the sample; Panel B includes firms with Moody's ratings of B or lower. **significant at 5% level; ***significant at 1% level.*

EXHIBIT 4

Returns of Long Underlying Stocks from Issuance Date

Months	Returns	*t*-value	Positive	Negative	Total	Significance
1	−0.69%	−0.60	66	59	125	0
2	−1.39%	−0.93	63	59	122	0
3	−3.90%	−2.17	56	67	123	2
4	−4.30%	−2.13	55	67	122	2
5	−3.70%	−1.51	57	63	120	0
6	−0.90%	−0.24	54	64	118	0
7	0.18%	0.05	56	59	115	0
8	3.56%	0.84	58	54	112	0
9	6.56%	1.50	55	54	109	0
10	14.03%	1.92	61	47	108	1
11	12.17%	1.80	57	51	108	1
12	14.61%	2.02	54	49	103	2
13	12.40%	1.74	50	50	100	1
14	11.25%	1.53	50	48	98	0
15	10.51%	1.46	52	46	98	0
16	13.73%	1.92	53	44	97	1
17	15.02%	2.09	55	42	97	2
18	19.53%	2.40	58	37	95	2
19	18.72%	2.17	54	40	94	2
20	17.38%	2.27	57	36	93	2
21	16.17%	2.22	59	33	92	2
22	18.13%	2.39	55	35	90	2
23	20.10%	2.79	56	34	90	3
24	24.18%	3.13	62	28	90	3
25	24.35%	3.19	61	28	89	3
26	26.81%	3.37	60	28	88	3
27	25.62%	3.28	58	29	87	3
28	26.27%	3.22	54	33	87	3
29	26.57%	3.22	57	29	86	3
30	29.23%	3.42	58	28	86	3
31	35.21%	4.05	59	27	86	3
32	38.23%	4.50	60	26	86	3
33	39.38%	4.73	60	25	85	3
34	42.27%	5.02	63	21	84	3
35	41.25%	4.73	60	22	82	3
36	41.97%	4.57	58	20	78	3
37	41.79%	4.31	54	23	77	3
38	46.30%	4.32	51	25	76	3
39	50.47%	4.48	52	23	75	3
40	51.29%	4.71	55	20	75	3
41	51.97%	4.67	53	22	75	3
42	54.61%	4.79	49	21	70	3
43	54.00%	4.60	46	21	67	3
44	51.22%	4.24	45	19	64	3
45	49.10%	4.04	43	20	63	3
46	48.40%	3.95	41	20	61	3
47	47.36%	4.00	43	18	61	3
48	64.24%	4.12	31	9	40	3

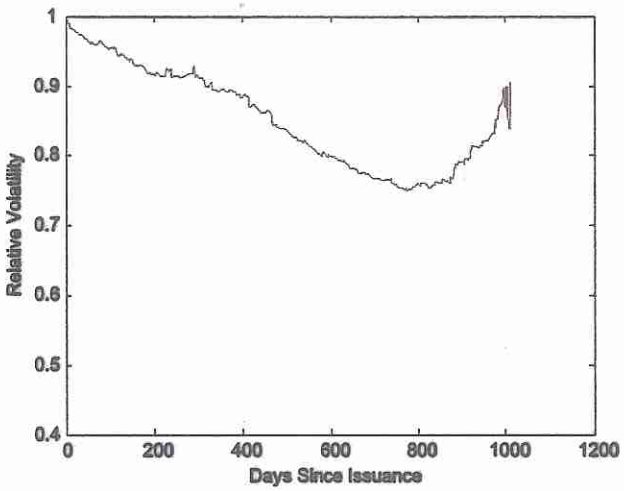
Note: This exhibit reports the average buy-and-hold returns of buying one underlying stock at the CB issuance date. The first column represents the holding period. The second column reports the returns of the pure long CBs portfolio; t-statistics for the returns are shown in Column 3. Column 4 (5) is the number of positive (negative) returns; Column 6 is the total number of observations at the end of X months after the issuance date. Column 7 is the significance level of the t-statistics in Column 3: 1, 2, and 3 denote statistical significance at the 10%, 5%, and 1% levels in a two-tail test, respectively.

EXHIBIT 5

Average Normalized Volatility (Relative Volatility) of Returns from Issuance Date

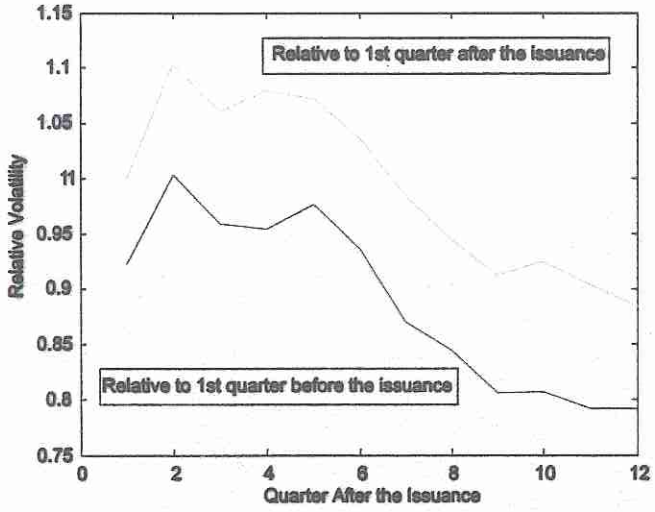
A. Daily rolling volatility

Normalized daily volatility is defined as the daily volatility on day D (calculated as the volatility of the logarithmic returns from D – 240 (240 trading days before D) to D – 1 (one trading day before D) divided by the volatility in the first trading date after the issuance.



B. Quarterly Volatility

The volatility in Quarter D is calculated as the volatility of the logarithmic returns in that quarter. Two alternative normalizations are shown: 1) based on the volatility relative to the first quarter before the issuance, and 2) based on the volatility of the first quarter after the issuance.



complete sample as well as for CBs with Moody's ratings of B or lower.

In sum, these results provide some support for initiating various trading strategies using convertibles. The divergent behavior of the CB and underlying stock returns over the first few months subsequent to the CB issues suggests that there may be benefits to arbitrage strategies involving long CB/short stock positions initiated at the time of the issuance of the CBs. Also, since the CBs and their underlying shares demonstrate some differential responses to interest rate and credit risk, explicitly accounting for such risks in the investment strategies may be beneficial. We now turn to addressing these issues in various arbitrage portfolios.

SIMPLE ARBITRAGE STRATEGY RETURNS

In this section, we begin to implement various trading strategies that exploit the nonlinear relationship of the CBs with respect to their underlying shares. Our first strategy is a "naive" strategy with equal money

EXHIBIT 6

Risk Components of Underlying Equity Returns

Panel A. All Firms

Independent Variable	Coefficient	*t*-Value
Constant	–0.003	–3.44***
Equity Risk	1.162	25.687***
Interest Rate Risk	0.239	2.035**
Credit Risk	0.262	4.072***
F-statistic	234.0**	

Panel B. Low Rated Firms (B or Lower)

Independent Variable	Coefficient	*t*-Value
Constant	–0.002	1.221
Equity Risk	3.086	17.973***
Interest Rate Risk	0.243	0.608
Credit Risk	0.670	3.493***
F-statistic	135.3***	

*Note: Random effect panel data regressions of CB holding returns on equity market risk, interest rate risk, and credit risk. The independent variables are 1) S&P 500 return; 2) the term spread, calculated as the difference between the rate on the 3-month Treasury bill and 6-month Treasury bill; 3) the difference between the average of Aaa utility and Aaa industrial bond rates and the average of Baa utility and Baa industrial bond rates (as the proxy of the credit risk). Panel A includes all the observations in the sample; Panel B includes firms with Moody's ratings of B or lower. **significant at 5% level; ***significant at 1% level.*

long CB/short underlying stock positions. With naive hedging, when the convertible price is less than par, the hedge is less precise and the price inefficiencies may be greater. In this case, naive hedging may be deemed as a relative-value strategy. In contrast, when the convertible price is at a large premium (e.g., greater than 120% of par), the prices of the CB and underlying stock will converge. For such CBs, the 1:1 hedging can be considered as a form of convergence hedging.

As demonstrated above, the shares underlying the CBs normally perform poorly during the first few months subsequent to the issuance date. Since the delta of the CBs is normally less than 1, equal money positions that are long CBs and short the underlying stocks are bearish and should be expected to generate positive returns during the first few months subsequent to CB issuances.

We simulate a portfolio by buying US$1,000 of CBs and shorting US$1,000 of underlying stocks from the issuance date of the CBs. This is a zero initial outlay by the investor. For convenience, the returns that are reported here are based on the long asset position in the portfolio. As shown in Exhibit 7, the strategy generates returns that are on average positive from the first month to the ninth month subsequent to the CB issuance. The trading profit reaches its maximum ($5,554) at the end of the fifth month after CB issuance and declines thereafter.

However, these results are not robust to the timeframe examined. As is shown in Panels B and C, the strategy performed consistently well only before 2001. The average returns are normally negative but not significant for the issues after 2001. This may in part be due to the nonlinear convergence effects: as noted earlier, conversion premia for CBs are higher after 2001.[10]

DELTA-NEUTRAL HEDGE

A popular approach used in convertible arbitrage is a delta-neutral strategy. In this case, the position is structured to try to keep the combined CB/equity position insensitive to changes in the price of the underlying stock. However, maintaining a market-neutral position may require rebalancing transactions. This rebalancing adds to the return of convertible arbitrage strategies.

The delta of CBs is calculated based on the Black and Scholes [1973] formula modified by Merton [1973] to incorporate a continuous dividend yield.

$$\text{Delta} = e^{-q(T-t)}N\left(\frac{\ln\left(\frac{S}{X}\right)+\left(r-q+\frac{\sigma^2}{2}\right)(T-t)}{\sigma\sqrt{(T-t)}}\right)$$

where S is the price of the underlying stock, X is the conversion price, q is the continuously compounded dividend yield of the underlying stock, r is the continuously compounded yield of the 10-year Treasury bond, and σ is the volatility of the logarithmic returns of the underlying stock calculated during the period from 240 days to 1 day before the issuance date. $T-t$ is the time until maturity. $N(\cdot)$ is the cumulative distribution function of the standard normal distribution.

The delta-neutral hedge trading strategy studied in this article is set up by buying CBs, while short-selling shares in accordance with the value of the CB delta. In the absence of convexity effects, the returns of the portfolio do not change with the change of CB and underlying stock prices. A long CB/short underlying stock portfolio represents a long volatility position. Since the gamma of the portfolio is positive definite, if the implied volatility of CBs of the portfolio increases over the period of the hedge, the extra returns in CBs will contribute to the returns of the portfolio, and vice versa.

The portfolio in this study is made without initial self-capital investment. Portfolios are set up (and rebalanced if necessary) according to the previous trading day's delta. If there is extra money left after the rebalance, the surplus will be invested in a risk-free vehicle; if there is not enough cash for the rebalance, the shortage will be covered by borrowing money from the market.

The delta-neutral portfolio cash flows emanate from: 1) coupon returns, 2) the interest rate gains or costs from the net cash position of the portfolio, and 3) the dividend cash outflows of the underlying stock from the shorted underlying stock.

The returns of the delta-neutral portfolio are calculated as the returns of the total long position in the portfolio. Exhibit 8 reports the daily portfolio returns of delta-neutral hedging with daily rebalancing. Each day we rebalance the portfolio by the previous day's delta. On the whole, for most of the first 36 months after the issuance, the delta-neutral portfolio returns are positive, as is shown in Panel A of Exhibit 8. The

EXHIBIT 7

Returns of Position of $1,000 Long CB and Short $1,000 in Stocks from the Issuance Date of the CB

Panel A. Complete Sample

Month	Returns	*t*-value	Positive	Negative	Total	Trading Profit
1	1.12%	1.70*	68	56	124	1401.8
2	1.67%	2.02**	69	53	122	2086.1
3	3.79%	3.59***	73	48	121	4740.0
4	4.26%	3.67***	75	45	120	5319.1
5	4.44%	3.39***	75	44	119	5554.0
6	2.36%	0.85	76	40	116	2946.0
7	2.83%	1.00	69	44	113	3533.8
8	2.16%	0.75	70	40	110	2694.7
9	1.26%	0.45	61	47	108	1575.8
10	–5.24%	–0.85	60	46	106	–6544.2
11	–3.61%	–0.64	59	47	106	–4510.2
12	–3.74%	–0.64	53	49	102	–4673.8

Panel B. Sample to the end of 2001

Month	Returns	*t*-value	Positive	Negative	Total	Trading Profit
1	2.63%	2.47**	41	24	65	3284.1
2	3.21%	2.56**	37	28	65	4017.7
3	6.62%	4.07***	46	19	65	8276.5
4	8.12%	5.21***	48	17	65	10151.0
5	9.14%	5.32***	50	15	65	11428.0
6	8.83%	4.80***	51	14	65	11034.0
7	9.24%	4.54***	47	18	65	11551.0
8	9.88%	4.50***	49	15	64	12354.0
9	8.42%	3.68***	45	19	64	10531.0
10	8.72%	3.38***	43	21	64	10899.0
11	9.35%	3.42***	44	20	64	11691.0
12	10.54%	3.73***	41	22	63	13171.0

Panel C. Post-2001 Sample

Month	Returns	*t*-value	Positive	Negative	Total	Trading Profit
1	–0.54%	–0.79	27	32	59	–671.9
2	–0.09%	–0.09	32	25	57	–116.5
3	0.51%	0.45	27	29	56	635.2
4	–0.31%	–0.21	27	28	55	–391.0
5	–1.21%	–0.71	25	29	54	–1516.2
6	–5.89%	–1.05	25	26	51	–7361.9
7	–5.86%	–1.00	22	26	48	–7322.2
8	–8.60%	–1.49	21	25	46	–10745.0
9	–9.16%	–1.62	16	28	44	–11450.0
10	–26.50%	–1.83*	17	25	42	–33124.0
11	–23.36%	–1.80*	15	27	42	–29198.0
12	–26.80%	–1.96*	12	27	39	–33500.0

**significant at 10% level **significant at 5% level ***significant at 1% level.*