

## Both A Borrower And A Lender Be

As long as we are on a Shakespearean bent, why not go straight from *Hamlet* to the lament from *Richard III*, "a horse! A horse! My kingdom for a horse?" Or, more to the present topic of how single stock futures will transform the business of securities lending, "my shares! My position for my shares!"

Of all the differences between futures and equities, the emplacement of a short position is one of the greatest. You do not have to borrow barrels of crude oil in order to take a short position in crude oil futures; it is understood while you could choose to deliver the barrels against the contract, you most likely are simply using the futures for other purposes. You could be speculating on a price decline, you could be trading against crude oil options or you could be long a crack spread. It does not matter: At no point prior to first notice will you need to make an affirmative declaration that, yes, you could deliver the crude oil physically against the futures.

This has not been the case for stocks. To go short a stock, you first had to borrow the shares, and that meant someone first had to lend them to you. Since a stock cannot be lent twice, and since each issue has a finite number of shares, a heavily shorted issue can become "hard to borrow." The largest supplies of stock available for loan are held in custodian banks such as State Street in Boston, Bank of New York, Northern Trust in Chicago and other august institutions. These banks hold the shares in trust, and are not eager to lend them to hedge funds and other borrowers directly.

Instead, prime brokerages took on the intermediary role of locating the shares, lending them to borrowers, and assuming the credit risk. This is another aspect of the business single stock futures will change. The exchange clearinghouse, whether the Options Clearing Corporate or the Chicago Mercantile Exchange Clearinghouse, is an AAA-credit counterparty to every single trade. The embedded credit swap in futures markets and the financial safeguards created by futures-style variation margins will lower the cost of engaging in short selling and stock lending.

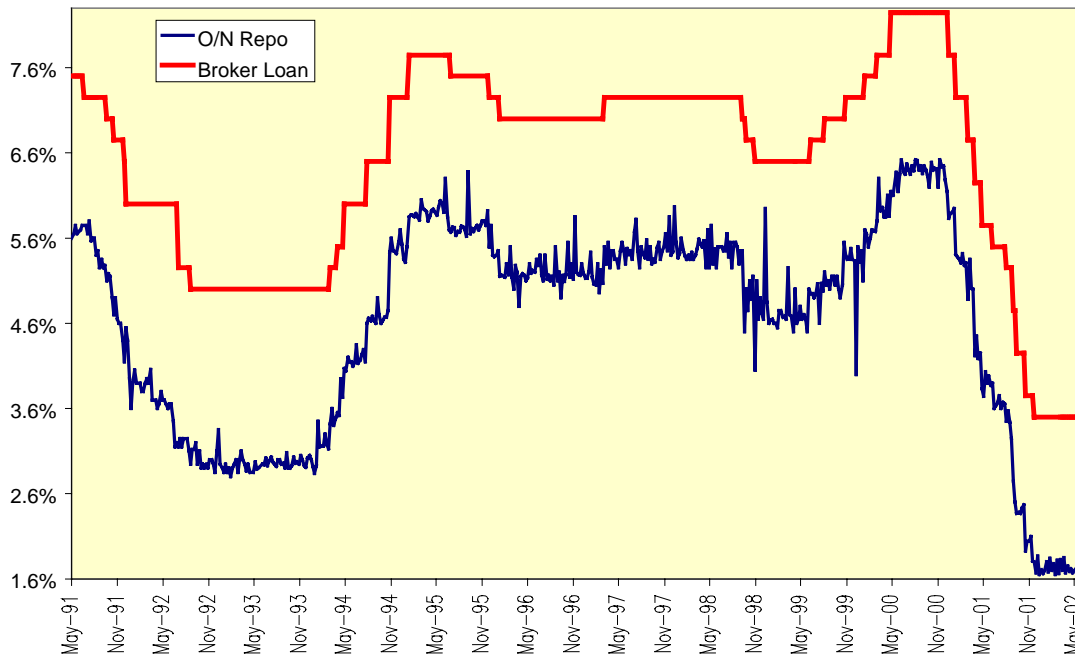
Anytime the transactions and credit costs of a market are reduced, and anytime the pricing of a market becomes more transparent, three things happen:

1. New entrants are attracted to the market;
2. The overall level of trading increases, often dramatically; and
3. Profit margins for existing participants in the market are pressured

### Broker Loan

In addition, the cash flow picture for short stock positions is different than the one prevailing for futures. If you go short a stock, you can earn interest on the funds received on the sale and held in escrow, but you have to pay the stock lender for the privilege. The short-term interest rate charged when brokerages borrow from banks to cover client positions, broker loan, is one of the highest short-term rates in the market, even though these loans are callable on 24-hour notice and are secured by client positions. Much like the prime rate, broker loan is "sticky;" it does not rise and fall as quickly as its closest cousin, the overnight repurchase agreement rate, as seen in "The Repo Man."

## The Repo Man: Broker Loan Is High And Sticky



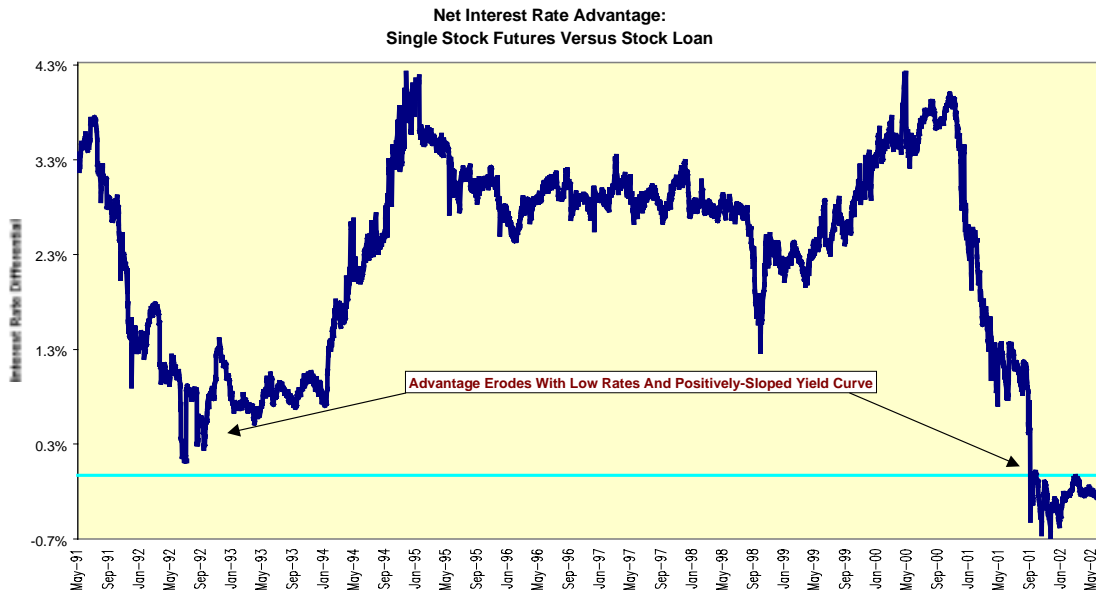
Stock futures pricing in a static world will be the stock's price plus its interest rate cost of carry – here the three-month repo rate – less the present value of expected dividends. If the dividend yield on a stock is greater than the repo rate, a situation obtaining throughout much of 2001 and 2002, the future will trade below the stock, and that creates some interesting opportunities to be discussed below.

$$Future = Stock * e^{rt} - \sum div * e^{rt}$$

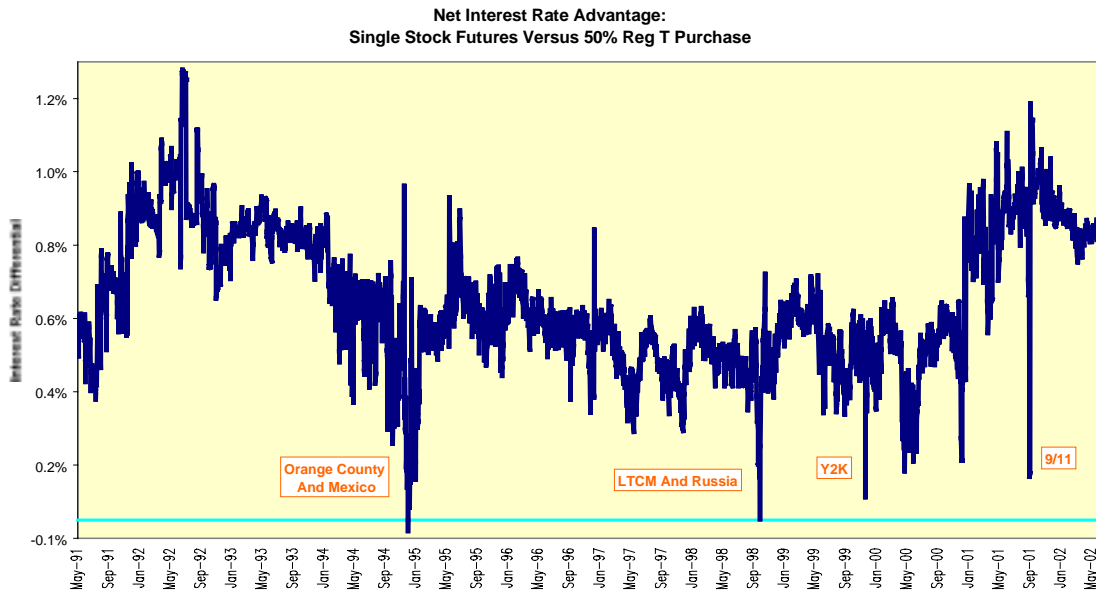
Experienced stock index futures traders are well aware of this relationship, but they should be aware of some major differences between indexes and individual stocks. First, the index futures are cash-settled; the need to locate shares for delivery does not exist. Second, no matter how volatile an index may seem, it will be less volatile than most of its constituent stocks by the simple mechanics of portfolio diversification. Third, by the same logic, the predictability of an index' dividend payout will be greater than that of an individual stock. All of these factors combine to push index futures toward a pure carry curve described by the equation above. Since the forward curve in such a market is pretty uninteresting, we should expect only one contract month of index futures to be active, and that is indeed the case. It will not, as we shall see, be the case for single stock futures.

Selling a future against a long stock position is lending at the repo rate for that maturity less the dividend yield. Conversely, buying a future against a short stock position constitutes borrowing at the repo rate for that maturity plus the dividend yield. The intermonth spreads along the curve are nothing more than yield curve trades in disguise, and should be arbitrated as such.

The interplay between broker loan, repo rates and Treasury bill rates creates an initial picture of relative advantage and disadvantage for single stock futures versus conventional stock purchase and loan. A short seller pays broker loan and receives T-bill interest with a 10% haircut. The seller of the future receives the repo rate as part of the futures basis. Since both the short seller and the short position in futures are paying the same dividend, there is no relative advantage stemming therefrom. The net differential, taken back to 1991, is displayed below:



We can, of course, extend the same comparison to the opposite transaction dyad, buying the security future versus buying the stock on 50% Regulation T margin. Here the buyer of stock can borrow 50% of the purchase price at broker loan and post T-bills with a 10% haircut in the account for the balance. The long position in the future will be paying the repo rate in the basis and will be forfeiting 10% of the T-bill rate in the margin account. Both types of buyers receive the same dividend, leading to the following net comparison.



### Rebates And Rolls

Whenever an interest rate is posted in the manner of broker loan or prime, room is left for negotiation. For the purposes of stock loan, the different supply/demand balances for each stock produces a price traders should be willing to pay for the privilege of borrowing that stock for the purpose of selling it short. This rate is called the rebate, and it will have a link to the forward curve of single stock futures.

In a physical commodity market, a commodity in short supply, in high demand, or wherein buyers are maintaining a just in time inventory policy and trying to stick producers with storage costs – all analogous to a hard to borrow stock – can move into a backwardated (inverted) forward curve. The degree of inversion can be measured by convenience yield, which simultaneously measures the hedge costs for a producer, the insurance against a process

shutdown by a buyer and the amount by which inventories will have to rise in price to justify paying a premium and storing them. Generically, convenience yield can be expressed as the annualized difference between the full carry price of a commodity, here simply  $Spot * e^{rt}$  for a commodity with no physical storage cost, and the actual futures price prevailing in the market, here  $F_d$ .

$$CY = \left[ 1 + \frac{Spot * e^{rt} - F_d}{Spot} \right]^{(365/d)} - 1$$

If a market is trading at its full carry price, as stock index futures tend to do, the convenience yield will be zero. If a market moves into contango, one where  $F_d > Spot * e^{rt}$ , the convenience yield will be negative. In all other cases, including those where the market is inverted, the convenience yield will be positive. Please note that if the dividend yield is greater than the repo rate that  $F_d < Spot$ , but despite the declining forward curve, we will not classify this situation as inverted unless the future actually is trading below its fair value price inclusive of the dividend.

We never should expect contango in single stock futures; the arbitrage of buying the stock and selling the over-valued future is simple. Stocks that are not hard to borrow should trade within the no-arbitrage bands around fair value defined by transaction costs. Indeed, single stock futures are likely to trade near the lower end of these bands to attract risk-seeking long speculators.

Hard to borrow stocks are likely to have inverted forward curves. Sellers can avoid the possibility of an immediate "fail," or inability to deliver the shares, by staying out of the delivery month and selling the back month. If the stock cannot be borrowed, it cannot be sold against an offsetting long position in a reverse cash-and-carry arbitrage, and this removes buyers from the back months. The net result in this situation will be a forward curve wherein the delivery month and no other contract trades within the bounds of arbitrage against the stock.

Those short in the delivery month for a hard to borrow stock can roll their short position forward to one of the discounted back months. This will involve costs equivalent to the convenience yield minus the interest rate differential along the yield curve. Unless the yield curve is stupendously steep, it is unlikely that the rate pick-up,  $[r_2 - r_1]$ , will be greater than the convenience yield, but at least the cost of the roll in an inverted market will be reduced thereby. Interestingly, rolling a short futures position forward in a carry market can produce a net lending gain if  $[r_2 - r_1]$  is greater than the transaction costs involved.

### Intermarket Relationships

Short sellers frequently get a rebate on their borrowing costs. If a stock is easy to borrow and the gains from shorting it are perceived to be low, the rebate is likely to be high as an inducement for short sellers. After all, stock sitting in a custodian bank is not earning the custodian anything beyond fees. However, if the shares are hard to borrow and short sellers see a gain from selling it, little inducement is needed. Rebates can fall or even turn negative. This environment will coincide with an inverted forward curve for that stock's future.

We can complete the picture by bringing in the option market. As rebates fall or go negative, the greater borrowing cost should make put options more attractive. The price and volatility of the puts will then rise to preclude an arbitrage. In sum, hard to borrow stocks will have an inverted forward curve for their futures and greater put option costs. Easy to borrow stocks will have a normal carry curve for their futures and put option volatility in line with the broad market.

### Taxes And Dividends

It is easy to conclude from the intermarket relationships described that there is no one single market clearing rate at which convenience yields, volatilities and rebates will rest in equilibrium. The system is dynamic; once any trade occurs, the other two markets must adjust. If this sounds a little messy, consider the effects of taxes and dividends on the forward curve.

Single stock futures have an, ahem, interesting tax environment. They are taxed as capital gains, but unlike other futures, they do not receive the blend of 60% long-term and 40-% short-term capital gains. Like other futures whose year-end equity is taxed under Section 1256, the year-end equity for dealers is taxed under Section 1234B. Bona fide hedges are exempt from marked-to-market accounting. The sale of a future against a long stock position does not constitute a constructive sale until and unless the stock is delivered against that contract. This may accelerate short sales of futures against long stock positions at year-end if and when we ever return to a bull market in equities. Finally, normal "wash sale" rules apply should you sell a stock and replace it with its future within 30 days.

Now let's add dividends. For those contracts with maturity greater than one year, the fair value of the future will be discounted by the dividend. The long future will accrue these dividends over time and convert their ordinary income into a capital gain... unless, of course, you are a dealer and your net open equity position on December 31st is positive, in which case the gain from dividend accrual will be taxed at the short-term capital gains rate of Section 1234B.

Look, these are taxes. If you want simplicity, sorry.

The entire system forms, in mathematical terms, an "unidentified system," which is a fancy way of saying there are more unknowns than equations. There is no "closed-form" solution to the impact of taxes on contracts past one year. Just as the intermarket relationships preclude a static equilibrium on single stock futures, so do the effects of taxes and dividends.

### **Hold On To Your Hats**

Is this something to worry about? Hardly: The foreign exchange market, the largest and most vibrant market in global commerce, is characterized by an unidentified system. The forward pricing of a currency depends on the two short-term interest rates and the current spot exchange rate, which gives us three unknowns in one equation.

We can describe the product in summation as one dynamically seeking equilibrium, possessing multiple solutions, and replete with four levels of arbitrage:

1. Stock-to-futures, maintained by fair value traders in normal markets;
2. Stock-to-futures plus rebate-to-stock loan, which can be maintained only by securities lending activity for hard to borrow issues;
3. Futures basis against broker loan adjusted for rebates; and
4. Option volatility against convenience yield

All of these factors should combine to create what could be the largest futures market in the world in a short period of time.

### **Stock Lending Is The Key**

The presence of a forward curve for stock futures will expand the equity swap market; just as in any swap, the present value of the forward curve can serve as the fixed index price against which cash flows are exchanged. The exchange of futures for physicals (EFP) transaction so common in physical commodities will extend to stocks as well as both buyer and seller can choose to remain floating on the price for as long as they wish.

In both cases, and indeed in the various arbitrages characteristic of single stock futures pricing, it will be necessary to have continuous access to shares. A liquid market for shorting stocks, our Depression-era financial laws equating buy with good and sell with bad notwithstanding, will serve to make equity markets more efficient. If this helps to preclude the bubbles that damaged Japan so much after 1989 and the rest of the world after the spring of 2000, then we in the futures industry have a lot of cause for pride.