

STOCK INDEX FUTURES IN JAPAN

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A new index and tighter restrictions on futures trading will not resolve the fundamental problems of the Japanese stock market. Claims that its collapse was caused by futures fly in the face of reason. The declining profitability of listed companies, low cash market liquidity and high transaction costs have little to do with derivatives. In fact the futures have acted as an outlet for market forces to address the inefficiencies and problems in the stock market.

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This article is a slightly edited version of the final section of an article published under a similar heading in the Spring 1993 issue (Volume 2 No. 1) of NRI Quarterly - Japan Viewpoint.

Stock index futures, particularly Nikkei 225 contracts, enjoyed explosive growth in Japan in the three years after their launch in late 1988. Futures became popular among institutional investors because of their low transaction costs and because they allowed greater flexibility in investment strategies. They also became popular because of developments in the stock market itself, including rising market volatility and a stronger correlation between individual stock price movements and movements in market indices.

In 1991, institutional investors bought futures aggressively, sending the price of futures well above their theoretical level, and triggering active arbitrage trading. However, the low liquidity of the underlying stocks, the market impact of index trading, and inadequacies in the futures trading system all worked to limit the amount of arbitrage possible, and arbitrage was not sufficient to bring the price of futures and their underlying stocks into balance. The far-month futures contract also consistently traded at a premium, so that many arbitrage positions were rolled over and outstanding positions accumulated.

In 1992, trading in stock index futures diminished greatly as investors became bearish, and as trading restrictions were tightened and brokerage commissions increased. The persistent gap between actual and theoretical futures prices closed, the premium in far-month contracts disappeared and the number of outstanding arbitrage positions declined dramatically.

The measures hastily taken by the authorities to tighten futures trading regulations are hindering the natural course of futures price formation and are obstacles to the long-term development of the stock market. Many 'problems' in the futures market are actually problems in the stock market, such as the low liquidity of stocks resulting from share crossholding. Futures function as an outlet for market forces to address these problems.

In December 1992 the Ministry of Finance announced it was beginning a comprehensive review of stock index futures trading, and was reconsidering the suitability of the Nikkei 225

index for futures trading on the Osaka Securities Exchange. Tighter restrictions on futures will not resolve the fundamental problems. The Ministry should work towards creating freer, more efficient and more internationally open trading in both stocks and stock index futures. It should concentrate on measures that will improve the markets, and encourage institutions to pursue efficient management of stock portfolios along with prudent investment in derivatives.

Based on the foregoing analysis of the structure of the stock index futures market, including the role of institutional investors in it, the current state of price formation in the market and arbitrage trading, we can offer some observations about the future of the stock index futures market.

USE OF FUTURES BY INSTITUTIONAL INVESTORS

Japanese stock prices in the late 1980s became completely unhinged from the fundamentals. As stock prices soared to dizzying heights, the asset value of stocks being managed in Tokkin funds, fund trusts and mutual funds increased dramatically. Although stock prices began retreating in early 1990, Japan's overall economy remained healthy until the start of 1992, and most Japanese remained confident about corporate performance and the economic outlook. Also distorting stock prices was the common habit of investors and traders to judge stock prices in light of their past highs.

Since the start of 1990, institutional investors — including Tokkin funds, fund trusts and mutual funds — have found it difficult to break with past attitudes and make investments in stocks based on more realistic appraisals of the earning capabilities of companies. Faced with rapid deterioration in the performance of their portfolios, and continuing cancellation of accounts by customers, many fund managers appear to have pinned their hopes on resuscitating their bad portfolio numbers by jumping into speculative short-term trading in stock index futures, taking advantage of the high leverage aspect of the futures.

The managers of Tokkin funds, fund trusts and mutual funds failed to anticipate stock price trends accurately and were naive in their use of stock index futures — two grave failings from the viewpoint of the clients whose monies were being managed. And, as more and more clients have cancelled their accounts, the market today has been punishing Tokkin funds, fund trusts and mutual funds for their sins. Fundamentally, however, this is a problem of client dissatisfaction over investment management services, and not a problem of speculation *per se*. Because of the problems that have occurred, it does not follow that speculative investment *per se* is bad for the market.

Speculators are essential in the derivative markets because they help supply the liquidity necessary for hedgers. The Japanese futures market does not have speculators of the sort that exist, for instance, in the Chicago market, which means that someone has to take on the speculator's role in order to ensure sufficient market liquidity. In any event, the derivative market is a zero sum game in which there will always be both winners and losers. In Japan's stock index futures market after 1990, the losers were primarily domestic institutional investors, including Tokkin funds, fund trusts and mutual funds. The winners were the bearish foreign investors, such as hedge funds, and the foreign securities houses based in Japan which were active in arbitrage trading.

There are a number of relevant questions that can be asked. Did institutional investors given charge of funds for investment purposes exercise proper care and act professionally as investment managers? Were their speculative investment activities in the derivative markets appropriate to the nature of the funds being managed? Did the clients of these institutions fully understand the speculative nature of these investment activities before they occurred?

To say that all speculative activities by institutional investors are undesirable is to take a very narrow-minded view. Most people who entrust their money to institutions for management no doubt prefer that their money be managed using low-risk investment methods. But there is also a definite demand in the marketplace for professionally managed funds that are, in varying degrees, speculative in nature. In fact, in the United States and elsewhere there are hedge funds and other institutions that offer high-risk, high-return investment services and, with client consent, engage in short-selling and derivative investment.

After the bitter experience of the early 1990s, domestic institutions have begun to refocus on their responsibilities as fund managers, and are reorganising their fund management operations and training highly specialised fund managers. Along with greater expertise on the part of fund managers, legislative reforms are needed to bring Japan's financial system more in line with world standards. For instance, changes are needed that provide the individual investor and fund sponsor with all the information he needs to make informed investment decisions. These include better mandatory disclosure of fund management performance and the introduction of hedge accounting methods as well as methods for evaluating asset management performance that are based on market value. Also needed are improvement in the infrastructure of the financial system such as will encourage prudent portfolio management on the part of institutional investors and promote appropriate uses of derivatives.

REGULATORY RESTRICTIONS ON THE FUTURES MARKET

Some critics still insist that the creation of a stock index futures market in Japan was the cause of the turmoil that hit the Japanese stock market starting in 1990, and that restrictions should be tightened on futures trading.

Any notion that stock index futures caused the collapse of stock prices flies in the face of reason. The root causes of the problems now affecting the Japanese stock market include the declining profitability of listed companies, the fact that stock prices are still high overall, the low liquidity of many stocks, and high transactions costs — factors that all relate to the stock market, not the futures market.

Trading in stock index futures became particularly active in Japan starting in 1990. In many instances, the futures market was ahead of changes in stock prices. However, the fact that price changes occurred first in the futures market does not mean that they were caused by the futures market. It is merely evidence that market participants — given a choice between futures and cash stock — two investment vehicles that are essentially the same in economics terms — prefer to use futures because of their higher liquidity and lower transaction cost. Through arbitrage trading, changes in the price of stock index futures prices do affect the prices of stocks. And it is quite conceivable that the existence of a stock index futures market did accelerate somewhat the speed at which stock prices came down from their lofty heights to more realistic levels. Yet, this effect is surely not a harmful one.

To a high degree, and for a long time, the Japanese financial system depended on rising land and stock prices, and this was particularly true in the latter part of the 1980s when asset prices were skyrocketing. Given this reality, the danger exists that a sudden and dramatic correction in asset prices can cause unexpected disruptions in the real economy. And over the past few years there have been many reasons for concern, including a dwindling of confidence in the stability of the financial system because of the mounting bad loans of Japanese banks and the massive erosion of 'unre-

alised' portfolio profits due to the collapse in share prices. It is thus understandable why the authorities, for reasons of economic policy, would seek to limit, to some extent, the speed of correction in prices of stocks and other assets. That this is the government's intention is clear from the comprehensive economic measures announced at the end of August 1992 as well as reports that the Ministry of Finance is exerting administrative 'guidance' on the selling of stock and stock index futures. The government's intentional restraining hand is also apparent in the tightening of restrictions that started in 1991 on trading in stock index futures.

Unnecessarily heavy and direct government intervention in the marketplace in order to stabilise prices runs various risks. It invites distortions in natural price formation in the capital markets that may adversely affect their resource allocation functions. Equally important, excessive market intervention by the authorities can lead to a loss of confidence among investors in the fairness of price formation in capital markets, and turn investors away from participating in the markets. The long-term consequence is weaker capital markets and slower economic growth.

One can also question whether restrictions on futures trading are actually effective. Certainly, from 1991 on, tighter restrictions on the futures market did result in a decline in the volume of futures being traded. The doubling of brokerage commissions on futures from 23 March 1992, seems to have been particularly effective in reducing short-term futures trading. But these measures have been of virtually no help in halting the slide in stock prices or boosting the volume of stock trading — which were probably the authorities' ultimate objectives in implementing them. On the contrary, the excessive restrictions on futures trading have simply shifted business to the Singapore International Monetary Exchange (SIMEX) and other overseas markets. In some cases, the tightening of restrictions on futures trading actually appears to have intensified the volatility of prices in the stock market.

A good example of tighter restrictions backfiring is the problem of the tighter restrictions on tick size and time for bid-ask quote renewal for stock index

Table 1: Trends in renewal tick size and time rules

	Initial	24/8/90	27/6/91	18/12/91	7/9/92
Renewal tick size	Y90	Y50	Y30	Y20 after 15.00 Y30 at close	
Renewal time	3 minutes	6 minutes	5 minutes		3 minutes when market is volatile

1. Applicable when the futures price is between Y20,000 and Y30,000

2. Since 5 February 1992, the afternoon session closes at 15.00

Source: Nomura Research Institute

futures. In 1990 the authorities lengthened the time interval between quote renewals and reduced the renewal tick size, even though stock price movements were becoming more volatile (see Table 1). The renewal tick size and time are determined on the basis of the price of the futures. At the end of August 1992, for example, when the price of a Nikkei 225 future was around Y18,000, the time rule was six minutes and tick size rule was Y30.¹⁵

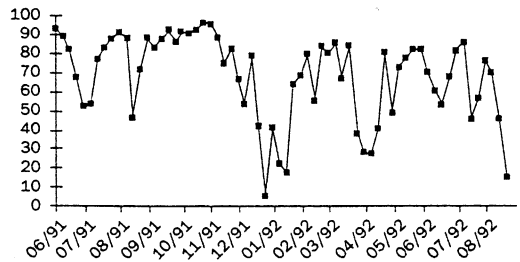
Assuming stock price volatility was the same as it is now, time and tick size rules at these levels are extremely unrealistic and inhibit smooth price formation in the futures market. A simple calculation illustrates this point. The volatility of Nikkei 225 futures in the first half of 1992 was over 30% per annum. For purposes of simplification, we will assume that the volatility is 32% per annum and that the expected rate of return is zero. There are slightly less than 250 trading days in an average year, and the market is open 4.5 hours a day, so the daily volatility of the Nikkei 225 futures is about 2%, or 0.3% every six minutes.¹⁶ At a Nikkei 225 future price of Y18,000 the standard deviation of price movements in the index over six minutes is Y54. Assuming that stock prices follow a lognormal distribution, there is a one third probability that Nikkei futures priced at Y18,000 will gain or lose Y54 or more in six minutes. At Y30, the tick size is 0.56 times the standard deviation — ie, the probability that the futures will move only within a plus/minus Y30 range in six minutes is only about 42%.

Figure 1 shows trends in the amount of time when actual trading in Nikkei 225 futures is possible as a percentage of total market hours.¹⁷ The amount tends to decline drastically on days when stock prices are highly volatile.¹⁸ We can thus conclude that the tighter restrictions on futures — including the renewal tick size and time rules — that were implemented from 1990 on when the volatility of the stock market was rising worked to hinder rather than facilitate smooth price formation in the futures markets. Some market sources believe that the volatility of futures prices actually intensified because these tougher restrictions led to an increase in market orders in the futures market, reducing the market depth.

Although not part of the tighter restrictions that went into effect in 1990, another factor inhibiting the smooth price formation of stock index futures is the difference that exists in the daily price limits for futures and stocks. (For both stocks and futures, these limits vary depending on the price level.) Again, we will illustrate the point using an example. At the end of August 1992, the simple average price of TSE first-section stocks was Y875. For stocks priced between Y500 and Y1,000, the limit on maximum price movement is Y100, which is 11.4% of Y875. The Nikkei 225 futures was priced at around Y18,000 at this time, and the price

limit on it was Y600, or slightly over 3% of Y18,000. Thus, if the Nikkei 225 stock price moved more than 3%, there would be no trading on the futures market. Yet because the stock market has a more liberal price limit of over 10%, trading could continue in stocks. What can happen as a result is that, despite a growing need for futures as a hedging instrument, trading on the futures market can effectively be stifled. Indeed, on several occasions since 1990 when stock prices have plunged sharply, futures prices could not keep pace with the price movements in the stock market because of the severe quote renewal rules and price limits, and massive selling has occurred in a largely illiquid stock market, further intensifying the volatility of stock prices.

Figure 1: Time when Nikkei 225 futures trading is possible



Note: For purposes here, the percentage of time when Nikkei 225 futures trading is possible is calculated by the equation: $PT = (1 - TQ/TT) \times 100$ where, PT = percentage of time when trading is possible; TQ = time (in minutes) when there are bid/ask quotes; and TT = total trading time (in minutes).

Source: Nomura Research Institute

In December 1992, the Ministry of Finance announced that it would review the market controls and trading systems for stock index futures, and reconsider the suitability of the Nikkei 225 index for futures trading on the Osaka Securities Exchange. Specifically, the Ministry said it was suggesting a plan to develop a new capitalisation-weighted stock index that would replace the Nikkei 225 index for futures trading on the OSE. The Ministry explained that its intention was to minimise the impact on the market resulting from the price movements of thinly traded stocks — ie, stocks that have relatively few shares outstanding and whose prices can thus be easily manipulated by market participants. In terms of theory, few would deny that using a weighted average based on market capitalisation, rather than price, is a better way to calculate stock price indices. Most of the stock price indices used in foreign futures exchanges, including the S&P 500 index, are calculated by this method. The Ministry's proposal thus seems reasonable in theory.

But, in actuality, there are several problems with this approach. Because of the widespread practice of cross shareholding, many Japanese stocks, particularly in the banking sector, do not have much liquidity despite their large market capitalisations. Using an index that is based on the weighted average of market capitalisations thus does not necessarily resolve the problem that the price movements of certain stocks can have a disproportionate effect on the level of the index. According to our calculations, if the method of calculating the Nikkei 225 is changed from a weighting based on price to one based on market capitalisation, without any change in the stocks that comprise the index, the rate of change in the index level resulting from a given volume of index trading will decline by almost 15%.¹⁹ However, changing the calculation method in this way will also mean that the six stocks exerting the greatest impact of the index level will account for 35% of the change in the index, instead of 10% under the existing method. This level of impact for six stocks is higher than the 30% impact that existed back in the late 1980s, when there was much concern that a few stocks were having a large impact on the Nikkei index.

There has been frequent criticism that the Nikkei 225 index is easily affected by the price movements of only a few stocks, but this problem has been rectified considerably as a result of changes in the composition of the index in October 1991 and October 1992. Nothing definitive can be said about the likely outcome of using a new index, since the Ministry of Finance has said nothing specific about the index formula, other than it will be a capitalisation-weighted index. It is hoped that the cure is not worse than the disease.

We believe that there are three basic problems in the ways in which the authorities have strengthened the restrictions on trading in stock index futures. First, these restrictions were not implemented after careful assessment of the situation based on theoretical and empirical analysis and the views of market participants. Instead, they have largely been the result of impressions and wishful thinking. For instance, the oft-cited view that futures trading has exacerbated the stock price decline and increased the volatility of the stock market has no basis in empirical evidence. In many cases, as in the tighter quote renewal rules, the authorities seem to have been reacting hastily to criticism of futures trading, and rushing ahead with new restrictions without giving sufficient thought as to their purpose and effectiveness or how they would affect other markets.

A second problem is that the authorities seem to lack an understanding of the integrated nature of the stock market as a whole. As the Brady Report stressed in its assessment of the October 1987 crash in the US stock market, the stock market today is an integrated market comprising both stocks and derivatives. This is equally true of the Japanese

stock market. Yet in Japan the authorities have taken the approach of treating the stock and futures markets as separate entities and imposing excessive restrictions on the latter.

The source of the problems in Japan's stock market since 1990 are to be found in the stock market itself; the futures market has only functioned as an outlet enabling investors to cope with the inefficiencies of the stock market. It is obvious that blocking off this outlet by restricting futures trading will not resolve the problems of the stock market. At least on this point, the December 1992 announcement by the Ministry of Finance suggests that some progress may be occurring in the awareness of the authorities, as the announcement mentions the need for coordinated control and operation of the stock and futures markets.

A third problem seems to be a lack of adequate understanding of the trend toward globalisation and deregulation of financial markets. Japanese stocks are now traded in markets all over the world, and the markets for futures and other derivatives are becoming even more global in scale. The authorities must keep in mind the linkages that exist among the trading activities of different markets around the world. For instance, traders who want to hedge their positions in Japanese index warrants and over-the-counter options traded in Europe will often use Nikkei 225 futures on the Osaka exchange. Japan's restrictions on futures trading ignore such linkages, and appear to have been implemented as though the authorities are aware only of the existence of a domestic market, domestic institutions and domestic securities companies.

Such narrow thinking does not pass muster in an era of freer and more globalized markets. Because of the onerous trading restrictions, much of Japan's futures business, especially arbitrage and option hedging by dealers, has shifted in the last two years from the Osaka Securities Exchange to the SIMEX — a classic example of how focusing only on the domestic market can backfire. And if the authorities do not coordinate with the SIMEX any plans they have for using a new index instead of the Nikkei 225 for OSE futures trading, the result may simply be a shift of more futures trading to the SIMEX.

The Nikkei 225 will likely remain in use as a stock price index, even if it is no longer used for futures trading on the OSE. Many index-related products that are currently available, including over-the-counter index options and index mutual funds, are linked to the Nikkei 225 index itself, not Nikkei 225 futures. Market participants using Nikkei 225 futures in Japan for hedging and managing index funds are thus likely to use the SIMEX in order to continue trading in futures that are based on the same index, rather than incur unnecessary basis risk.

CONCLUSIONS

This article has examined the way in which futures trading can be improved. It has also considered problems in the current restrictions on the stock index futures market. Our principal conclusions may be summarised as follows:

The rapid growth of trading in stock index futures, especially Nikkei 225 contracts, occurred because: (1) index futures offer lower transactions costs than trading in the underlying stocks; (2) the use of futures and other derivatives broadens the range of possible investment strategies; (3) the growing volatility of stock prices; and (4) an increasingly closer correlation between individual stock price movements and movements of the index.

An examination of trading activity in stock index futures by type of institution shows that Tokkin funds, fund trusts and mutual funds all became active short-term speculative trading in such futures, probably in an attempt to prop up deteriorating portfolio performances resulting from the collapse of stock prices from 1990 on. Such speculative investment in futures by institutional investors using client funds was not without problems.

For example, in 1991 the actual price of stock index futures rose way above the theoretical price as domestic institutions bought futures aggressively, encouraging active arbitrage trading in the stock market. For an extended period of time in 1991, the far-month contract traded at a substantial premium to the near-month contract, which meant that arbitrage positions were not closed but rather rolled over to the next delivery month, forming a build up of outstanding positions. The outstanding amount of arbitrage positions accumulated, but the 'flow' of arbitrage in terms of the volume of stock and futures being traded remained constricted by several factors — including the low liquidity of certain Nikkei 225 stocks, the market impact of index trades on stock prices, and inadequate rules and regulations in the futures market — with the result that arbitrage trading was not sufficient to bring stock and futures prices into balance. After 1992, however, many institutional investors turned bearish on stocks and futures trading restrictions were tightened, including a doubling of brokerage commissions, resulting in a dramatic decline in the volume of stock index futures being traded. The persistent gap between the actual and theoretical price of futures disappeared. Moreover, the far-month contract stopped trading at a large premium to the near-month contract, and the number of outstanding arbitrage positions decreased.

Many of Japan's institutional investors appear to have learned from their bitter experience since 1990. Many are now revamping their fund management operations and improving their specialist skills. It is hoped that these efforts will lead to greater sophistication in the use of derivatives.

The tighter restrictions that have been hastily imposed on the stock index futures market in reaction to the collapse of stock prices since 1990 have caused numerous problems, including the obstruction of smooth price formation, and are clearly detrimental to the long-term development of the stock market. In many ways, the futures market has functioned as an outlet for market forces to address the inefficiencies and problems in the stock market, and these problems cannot be resolved simply by shutting off this outlet in an *ad hoc* manner. It is hardly surprising that the problems of the stock market have not been resolved by the tighter restrictions of the futures market. It is also clear that restrictions on futures trading that take only the domestic market into account are counterproductive in today's age of global financial markets. The Osaka Securities Exchange has already lost a good part of its Nikkei 225 futures business to the SIMEX.

The authorities should concentrate on making the stock market freer, more global, and more efficient. They should improve the basic infrastructure of the market in ways that encourage institutional investors to pursue prudent management of stock portfolios and the appropriate use of derivatives. Specific measures that are desirable include: (1) steps to increase the liquidity of the stock market; (2) more detailed disclosure of fund performance by institutional investors; and (3) the use of market value-based accounting and hedge accounting in asset management evaluation.

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