

Just The DAX, Ma'am

In a song riff made so memorable by Tina Turner, "... y'know, every now and then, we like to do something nice and easy... But we never, ever, do anything nice and easy!" Music historians may never settle the question of whether she was addressing how the futures industry handles new products and ideas, but no matter: she very easily could have been.

Consider the introduction of technology to all facets of trading in the U.S. After much delay, the stock exchanges have finally acceded to price equities in decimals -- dollars and cents -- rather than those Spanish pieces-of-eight so dominant elsewhere in our lives. Hand-held terminals and audio headsets on the trading floor? Someday. However, electronic trading in the U.S. is advancing in dribs and drabs, and such ventures as the Chicago Board of Trade's (CBT) Project A and the NYMEX' Access system can be classified as successes, as can the Chicago Mercantile Exchange's (CME) Globex trading of the S&P 500 in early morning hours.

Globalization hasn't proceeded "nice and easy," either. The patchwork of mutual offsets, joint ventures, common clearing, and product licensing between exchanges has been accreting at a sedimentary pace. Just as the vested interests of seat owners are threatened by technological advances, the vested interests of exchanges are threatened by the loss of control over their most important products.

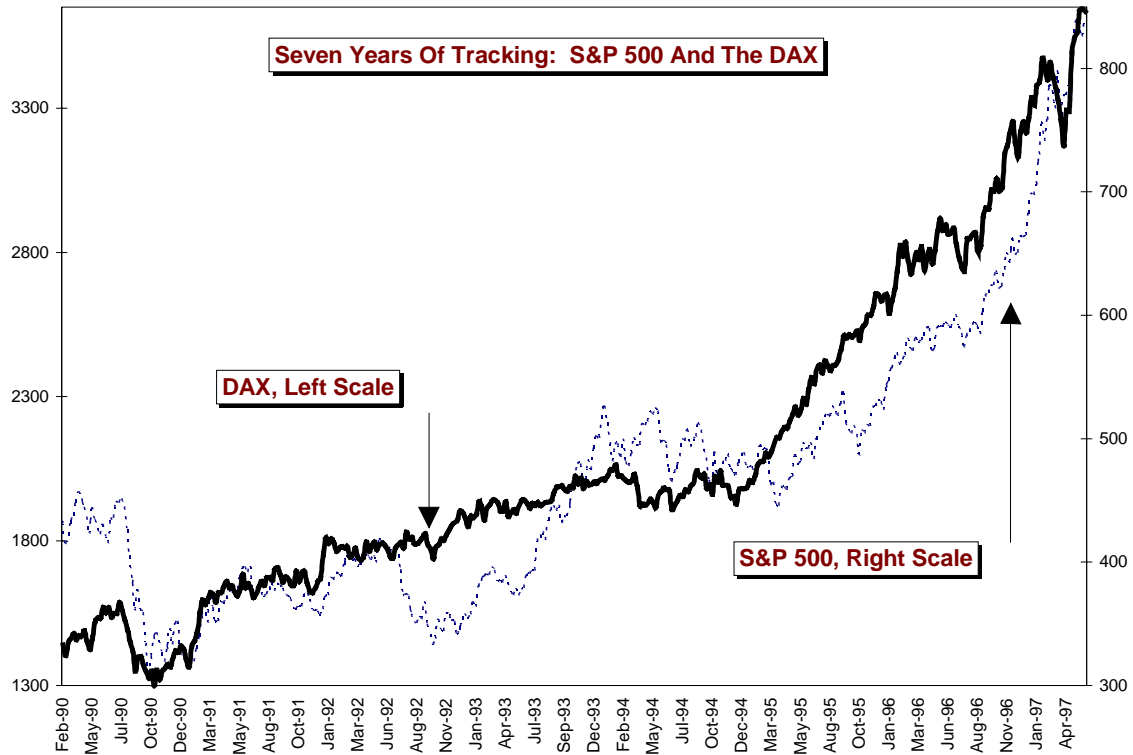
However, none of this chaos on the surface may be as detrimental to the long-term success of the industry as it may seem; the random mating of products, systems, and exchanges is duplicating nature's own genetic algorithm, and should therefore start to produce some strong and resilient offspring.

One of these successful products may be the joint venture between the CME and the Deutsche Terminborse (DTB). The DTB, unlike its American counterparts, has always been an electronic exchange. It has no trading floor, no locals, no open outcry, and no statue of Fraulein Ceres on the roof. Yet it is now second only to LIFFE amongst European derivative exchanges, and is the leading European equity option exchange.

The DTB's leading equity index future is the Deutsche Aktienindex, or DAX, which is a capitalization-weighted index of 30 blue-chip stocks representing over 60% of the total equity capitalization of German exchange-listed stocks. Thus it is capitalization-weighted and highly representative of the overall market, like the S&P 500, and narrowly-based among a small group of large stocks, like the Dow Jones Industrials. The DAX futures have been trading about 28,000 contracts per day so far in 1997.

The CME and DTB have entered into an agreement whereunder CME clearing members with a DTB membership may trade DAX futures from screens in their booths. The trading hours for the two contracts overlap a surprising amount given the seven-hour time difference between Chicago and Frankfurt. The DAX opens at 0200 Central and trades until 1000 Central; the S&P 500 trades on Globex through 0815 Central and then trades in the pit until 1515 Central.

Do trading opportunities exist between the two markets? Yes, and this should not be surprising from a fundamental point of view. The major companies in both markets are large, global players who compete with each other in their respective marketplaces and who compete with each other for investor attention in liquid, mature capital markets linked by active interest rate and currency arbitrage. A list of pairs highlights the obvious: Bayer/Merck, SAP/IBM, Volkswagen/Ford, Telekom/AT&T, BASF/DuPont, etc. The weekly "Tracking" chart over the period since the February 1990 inception of DAX futures depicts how strongly the two markets parallel one another even though the American and German economies, political systems, and monetary policies often have diverged during this period.



High-Frequency Relationship

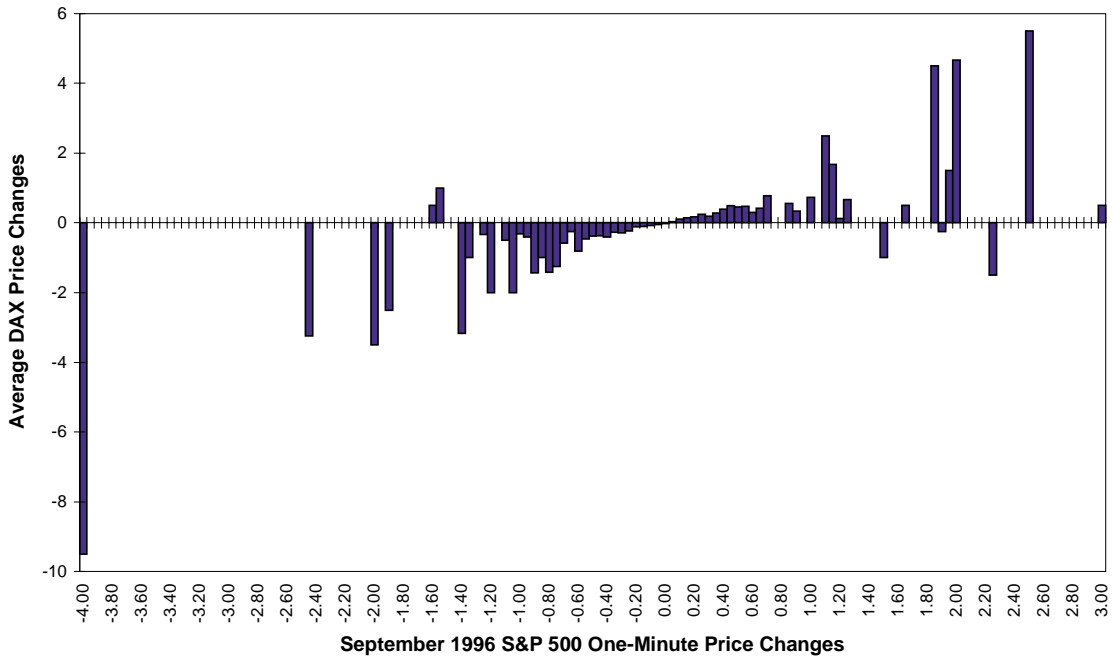
A set of one-minute data for both futures for the September 1996 - June 1997 period constructed to coincide with the minute-by-minute time overlap between the two contracts, Globex trading included. The data were examined with the goal of determining whether the DAX could be traded profitably through one of the DTB terminals on the CME floor.

Two histograms are presented for the September and December 1996 contracts. In both cases, the average change in the DAX (in marks) is plotted as a function of the change in the S&P 500; the data includes many fast market segments for both markets. The general relationship is unmistakable: a nimble trader could follow the S&P 500 on the CME in order to trade the DAX.

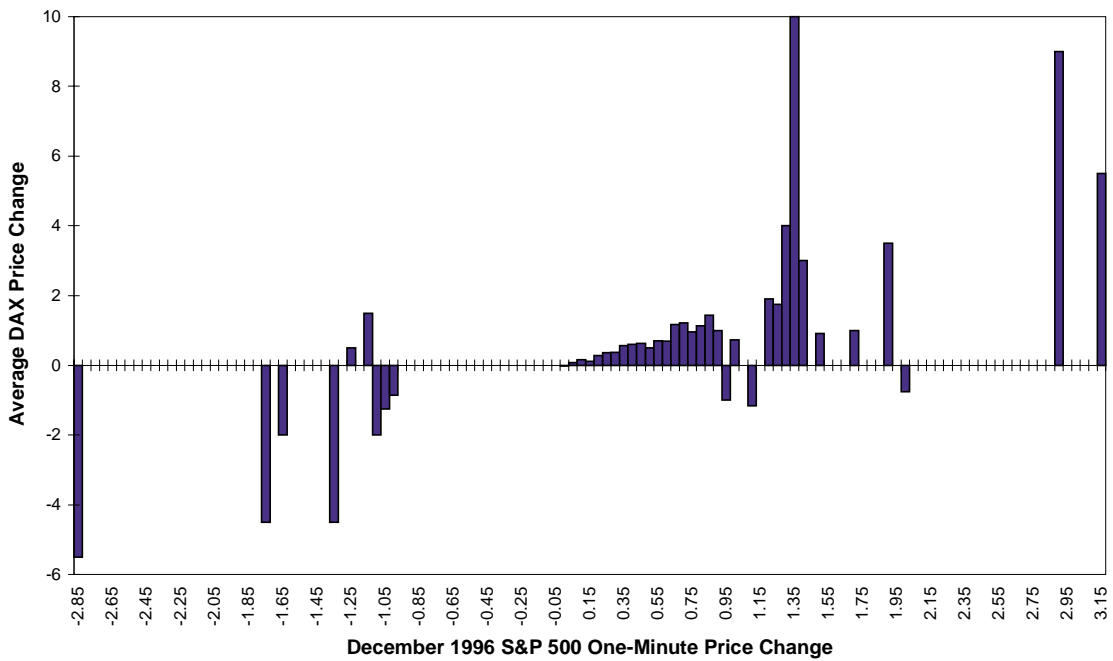
Moreover, the data are consistent across large samples. Consider the following table for the September, December contracts over the period when both were the front contract, and the June contract from March 13 - May 6, 1997. The percentage of non-conflicting price changes (e.g., a positive or neutral minute change for the DAX as a function of a positive minute change for the S&P 500) is virtually identical for September and December, and is not significantly different for June.

	Observations	Concurrence	Agreement
Sep-96	11,628	9,189	79.0%
Dec-96	11,984	9,514	79.4%
Jun-97	7,819	5,732	73.3%

Average DAX Price Change As A Function of S&P 500 Price Change



Average DAX Price Changes As A Function Of S&P Price Changes



The table below summarizes the minute-by-minute relationship between the two March 1997 contracts over the January 3 - March 13 period on a daily basis. The column labeled "Concurrent Agreement" is the number of observations where

- the S&P 500 had a non-zero price change; and
- the DAX had a price change of the same sign during that same minute.

The column labeled "Subsequent Agreement" is the number of observations where

- the S&P 500 had a non-zero price change;
- the DAX was unchanged in the same minute; and
- the DAX had a price change of the same sign in the subsequent minute

	Number Obsv.	Concurrent Agreement	Subsequent Agreement	Combined Agreement	Percent Agreement
3-Jan-97	404	278	74	352	87.1%
6-Jan-97	449	289	51	340	75.7%
7-Jan-97	456	315	64	379	83.1%
8-Jan-97	452	318	69	387	85.6%
9-Jan-97	462	303	77	380	82.3%
10-Jan-97	411	272	56	328	79.8%
13-Jan-97	464	318	67	385	83.0%
14-Jan-97	418	282	69	351	84.0%
15-Jan-97	455	320	73	393	86.4%
16-Jan-97	433	285	61	346	79.9%
17-Jan-97	395	280	78	358	90.6%
20-Jan-97	423	313	68	381	90.1%
21-Jan-97	459	294	58	352	76.7%
22-Jan-97	476	326	51	377	79.2%
23-Jan-97	488	332	84	416	85.2%
24-Jan-97	480	334	56	390	81.3%
27-Jan-97	461	309	90	399	86.6%
28-Jan-97	471	321	78	399	84.7%
29-Jan-97	497	318	79	397	79.9%
30-Jan-97	430	280	80	360	83.7%
31-Jan-97	383	263	60	323	84.3%
3-Feb-97	425	277	58	335	78.8%
4-Feb-97	397	278	78	356	89.7%
5-Feb-97	454	319	72	391	86.1%
6-Feb-97	452	303	59	362	80.1%
7-Feb-97	391	269	83	352	90.0%
10-Feb-97	310	207	63	270	87.1%
11-Feb-97	445	296	54	350	78.7%
12-Feb-97	467	288	39	327	70.0%
13-Feb-97	472	341	64	405	85.8%
14-Feb-97	403	266	36	302	74.9%
18-Feb-97	432	293	64	357	82.6%
19-Feb-97	453	285	48	333	73.5%
20-Feb-97	449	276	42	318	70.8%
21-Feb-97	423	283	67	350	82.7%
24-Feb-97	253	169	34	203	80.2%
25-Feb-97	434	292	52	344	79.3%
26-Feb-97	429	293	66	359	83.7%
27-Feb-97	489	296	50	346	70.8%
28-Feb-97	467	320	63	383	82.0%
3-Mar-97	343	234	33	267	77.8%
4-Mar-97	455	299	37	336	73.8%
5-Mar-97	456	294	43	337	73.9%
6-Mar-97	476	320	40	360	75.6%
7-Mar-97	390	248	31	279	71.5%
10-Mar-97	402	266	59	325	80.8%
11-Mar-97	430	306	57	363	84.4%
12-Mar-97	424	276	38	314	74.1%
13-Mar-97	346	227	29	256	74.0%
	21,134	14,171	2,902	17,073	80.78%

Once again, the strong and highly tradable relationship emerges, and is statistically consistent with both across individual days and across contract months.

Traditionally, exchanges offer the advantages of centralized price discovery and of clearinghouse credit quality to their customers and the economic benefits of being able to make markets, scalp trades, and have access to order flow for their members. The first two advantages for customers have been eroded by technology and the growing sophistication of the OTC markets. The inevitability of increased electronic trading may erode the economics of exchange membership for seat owners. The CME-DTB experiment bears watching, as it offers a screen trading opportunity for those actually involved in open outcry trading.

However, even if the joint venture is successful, it will only be a step in the transformation of the futures industry from a labor-intensive market to an even more capital-intensive market. The late British mathematician Alan Turing proposed in the 1950s a simple test of artificial intelligence which has stood the test of time: When you don't know whether you are talking (playing chess?) with a person or a computer, then artificial intelligence has arrived. Let us propose to extend that definition to trading: When you pick up the phone and shout "buy 50 Dec corn at the market!" and your fill is reported back without you being aware of whether it was executed via open outcry or a machine, then we will have high-tech futures trading.