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J. Austin Murphy
Oakland University

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As the commodity exchanges continuously expand the array of different contracts available for investment, the futures market has taken on an increasingly important function in business. This importance is mirrored by the enormous usage of the futures market by participants. For example, in 1980, dollar volume in the futures market was over $2 trillion, more than 5 times the annual stock market turnover (Barnes [1]). However, in spite of its importance, the risk-return relationships in this vast market have not been fully explored.

Prior investigations of the futures market, such as by Bodie [3] and Rosansky [4], Carter, Rausser, and Schmitz [7], Chang [8], Houthakker [16], Marcus [17], Park [19], and Rockwell [20], have generally focused on the returns to isolated groups of contracts. The general findings seem to indicate that long futures positions earn higher returns than short positions, but the studies are too scattered across time periods and contracts to provide any conclusive evidence on the subject. In addition, Murphy [18] has uncovered evidence that any higher returns to the long position may no longer exist because of a structural break which occurred in the futures market in 1974 when fiduciary speculation was first allowed.

Numerous papers have also studied the contribution of futures contracts to the risk of investors' portfolios, and the findings are mixed. For instance, Dusak [9] discovered commodity futures to contribute insignificantly to the risk of investors' portfolios, whereas Breeden [5] employed a different measure of investment risk and found commodity futures risk varied across contracts.

Other studies have focused on the usefulness of futures contracts as a hedge against inflation. Bodie [3] found commodity futures contracts to exhibit positive correlation with the inflation rate over long periods of time, but Herbst [14] found commodity futures to be of limited use in hedging against inflation.

Although the quantity of articles written on the futures market has been large, research which evaluates the risk, return, and spreading opportunities between the commodity and financial futures markets is lacking. This paper seeks to fill the gap in the literature. In Section I, measures of return and portfolio risk on futures contracts are defined. In Section II, the data and the empirical examination procedure are described. In Section III, the results are analyzed. In Section IV, the findings are summarized.

I. Return and Portfolio Risk on Futures Contracts

As shown in Hilliard [15], the return on a portfolio k, consisting of futures contract K and nominally risk-free T-bill S posted as security margin, can be calculated as

$$\tilde{r}_k = r_S + [(\tilde{K}_1 - K_0)/S_0], \tag{1}$$

where r_S is the risk-free return on the T-bill S posted as margin, S_0 is the initial purchase price of the T-bill, K_0 and K_1 are the prices of the futures contract K in periods 0 and 1 respectively, and $\sim$ denotes a random variable.

For long futures positions upon which 100% margin is posted, $S_0 = K_0$ and (1) reduces to

$$\tilde{r}_k = r_S + (\tilde{K}_1 - K_0)/K_0. \tag{2}$$

Posting less than 100% margin merely leverages the basic position in (2) at the risk-free rate. The general formula for the **excess** return on a futures position is therefore

$$\tilde{R}_k = \tilde{r}_k - r_s = (\tilde{K}_1 - K_0)/K_0. \tag{3}$$

Since expected returns on any asset or portfolio can not exceed equilibrium required returns in an efficient capital market (Fama [10]), risk-return tradeoffs on futures investments should be consistent with the risk-return tradeoffs on other assets. Black [2] has therefore hypothesized that excess returns on futures contracts as measured by (3) should be characterized by Sharpe's [22] Capital Asset Pricing Model (CAPM).

According to the CAPM, the expected excess return on any asset or portfolio is determined by the identity

$$E(\tilde{R}_k) = \beta_k E(\tilde{R}_m), \tag{4}$$

where E is the expected value operator, subscript m denotes the market portfolio of spot assets, and the beta of the asset is defined by the formula

$$\beta_k = \mathrm{Cov}(\tilde{R}_k, \tilde{R}_m)/\mathrm{Var}(\tilde{R}_m). \tag{5}$$

The relevant measure of risk in the CAPM is the covariance or co-movement of an asset with the market portfolio of all assets. According to the model, any other risk can be diversified away in a portfolio and is therefore irrelevant. Although alternative measures of financial risk exist (Breeden [5]), the CAPM continues to be the model most widely used in practice by investors. In addition, Dusak [9] and Murphy [18] have found empirical evidence in the futures market which is consistent with the CAPM. As a result, the relevant measure of the risk of futures contracts for most investors is given in (5), while excess returns can be computed using (3).

II. The Empirical Examination Procedure and Data

To evaluate the risk and return of futures contracts, it is initially useful to compute the mean and standard deviation of the excess return of each contract. Although the standard deviation of return would he largely irrelevant to diversified investors, there exist futures participants who do not hold well-diversified portfolios. The standard deviation of the return on a futures contract provides some indication of the risk of a contract for undiversified investors who speculate on a single futures position.

Many undiversified futures participants, however, speculate on the spread between two or more future prices (Shrock [21]). For such investors, called spreaders, a correlation matrix depicting the co-movement between the various contracts would provide meaningful information as to the risk of their position.

In addition, according to Bodie [3], many traders regard futures investments as potential hedges against inflation. Thus, it would be useful to calculate the actual correlation of each contract with the inflation rate.

For the majority of investors who are well-diversified, however, the primary relevant measure of risk would be the contract's beta, as explained in Section I. The portfolio risk of each futures contract can be examined by estimating the regression coefficient from the equation

$$\tilde{R}_k = \alpha_k + \beta_k \tilde{R}_m + \tilde{e}, \qquad (6)$$

where the intercept, alpha, represents the mean excess return on the contract above that required by investors to compensate them for beta risk. A positive alpha for a contract implies that the contract earned higher returns than required by investors to compensate for its contribution to the risk of a diversified portfolio, while a negative alpha indicates that the contract earned lower returns than required by diversified investors.

The data for the empirical examination consist of 60 monthly observations from May 1980 through April 1985 on 30 futures contracts. Included in the sample are U.S. futures contracts on all commodities and financials which were listed in **The Wall Street Journal** in 1980 and which were not delisted in any subsequent year through 1985. The 30 commodities and financials whose futures contracts meet such specifications are corn, oats, soybeans, soymeal, soyoil, hard winter wheat, soft winter wheat, spring wheat, feeder cattle, live cattle, hogs, pork bellies, cocoa, coffee, cotton, orange juice, world sugar, lumber, copper, gold, platinum, silver, British Pounds, Canadian Dollars, Deutsche Mark, Swiss Francs, Yen, GNMAs, T-Bills, and T-Bonds.

For each commodity and financial, the futures contract with the second nearest maturity is used. The second-nearest maturity is employed because such contracts are less likely to be characterized by low volume and a potential liquidity premium (Gray [13]). For substantially identical commodities or financials selling on more than one exchange, the second nearest contract on the exchange with the greatest open interest in 1980 is employed.

For the proxy for the market portfolio, two alternative portfolios are employed, with the first proxy being a simple 100% investment in corporate equities. This proxy has been used in previous investigations of the futures market by Dusak [9] and others.

The second proxy employed is a portfolio consisting of 60% equities, 30% corporate bonds, and 10% T-bonds. This weighting has been employed in other risk-return research by Friend, Westerfield, and Granito [11]. As shown by Galai and Masulis [12], this proxy is theoretically more correct since, by including corporate bonds, it represents a better measure of the total return to productive business assets.

For the equity portion of each proxy, the return on the S&P 500 is used, with capital gains and dividend yield being gathered from **Outlook**. For the corporate bond portion, returns are measured assuming equal-weighted investment in the 20 bonds of the Dow Jones composite bond index, with capital gains on the index being available from **The Wall Street Journal** and coupon income being listed in **Barron's**. For the T-bond portion, the return on the Treasury bond with the longest maturity at the end of each month is used, with prices and coupon income being collected from **The Wall Street Journal**.

For measuring the risk-free rate, the ask price of one-month T-bills listed in **The Wall Street Journal** is converted to a monthly return using the standard formula. For measuring the inflation rate for each month, the Consumer Price Index (CPI) is utilized, with CPI data being available from **The Survey of Current Business**.

III. The Empirical Analysis

In Table I are shown the means and standard deviations of excess returns on each contract, as well as the alphas, betas, and inflation correlation coefficients. As can be readily seen, nearly all of the contracts earned negative mean excess returns as well as negative abnormal returns. In fact, only five of the twenty commodity futures contracts (soyoil, live cattle, pork bellies, coffee, and orange juice) and only one of the ten financial futures contracts (T-bills) earned positive abnormal returns. These results were not significantly affected by the choice of the market proxy. The lack of positive returns are in contrast to previous studies and appear to support Murphy's hypothesis [18] that a structural change has occurred in the futures market.

Table I also shows that only three of the commodity futures (orange juice, coffee, and cotton) and no financial futures contracts generated negative beta risk of any sort. Indeed, most of the contracts appear to contribute positively to the risk of diversified portfolios, with fourteen (nine) of the positive contract betas being statistically significant at the .05 level of significance for the stock (stock and bond) proxy.

Although there are a few volatile contracts (pork bellies, sugar, and silver) with double-digit standard deviations, most of the contracts seem to have fairly low variances. In fact, since the Kansas City Board of Trade's **The Future is Here** has found an average stock to have a standard deviation of about 9%, only seven of the futures contracts appear to be more volatile than the average stock. As is well-known, much of the reputation in the futures market for volatility is caused

Table I

Futures Contract Risk-Return Tradeoffs

$$E(\tilde{R}_K)=E(\tilde{r}_K)-r_S=\alpha_K+\beta_K E(\tilde{R}_m)+\tilde{e}$$

	Mean Excess Return	Standard Deviation	Inflation Correlation Coefficient	m = Stocks				m = Stocks and Bonds			
				α	$t(\alpha)$	β	$t(\beta)$	α	$t(\alpha)$	β	$t(\beta)$
Corn	-0.45	5.41	.11	-0.68	(-1.00)	0.40	(2.51)	-0.53	(-0.76)	0.24	(1.10)
Oats	-0.13	5.30	-.02	-0.34	(-0.51)	0.38	(2.43)	-0.23	(-0.33)	0.30	(1.40)
Soybeans	-0.49	7.54	.01	-0.73	(-0.75)	0.42	(1.84)	-0.59	(-0.60)	0.28	(0.95)
Soymeal	-1.39	7.46	-.01	-1.60	(-1.67)	0.38	(1.69)	-1.47	(-1.51)	0.24	(0.80)
Soyoil	0.67	9.59	.01	0.33	(0.27)	0.53	(1.81)	0.47	(0.38)	0.43	(1.14)
Wheat (Hard Winter)	-0.34	4.14	.03	-0.43	(-0.81)	0.16	(1.28)	-0.35	(-0.65)	0.04	(0.23)
Wheat (Soft Winter)	-1.22	5.18	.14	-1.34	(-2.02)	0.22	(1.41)	-1.27	(-1.87)	0.12	(0.60)
Wheat (Spring)	-0.34	3.37	.13	-0.40	(-0.90)	0.10	(0.96)	-0.35	(-0.79)	0.03	(0.20)
Cattle (Feeder)	-0.19	4.43	.03	-0.26	(-0.45)	0.12	(0.88)	-0.27	(-0.47)	0.23	(1.29)
Cattle (Live)	0.32	4.57	.14	0.30	(0.51)	0.04	(0.25)	0.30	(0.50)	0.08	(0.42)
Hogs	0.02	6.80	-.12	-0.09	(-0.11)	0.20	(0.94)	-0.04	(-0.04)	0.16	(0.58)
Pork Bellies	0.23	10.20	-.10	0.10	(0.08)	0.41	(1.29)	0.17	(0.13)	0.47	(1.36)
Cocoa	-0.68	9.37	-.08	-0.74	(-0.60)	0.11	(0.38)	-0.65	(-0.53)	-0.09	(-0.23)
Coffee	0.45	8.41	.08	0.48	(0.44)	-0.06	(-0.24)	0.44	(0.40)	0.01	(0.02)
Cotton	-0.58	5.01	.12	-0.66	(-1.00)	0.13	(0.86)	-0.58	(-0.88)	-0.02	(-0.11)
Orange Juice	1.35	9.74	-.01	1.48	(1.16)	-0.24	(-0.80)	1.45	(1.14)	-0.30	(-0.77)
Sugar (World)	-4.25	14.99	.06	-4.52	(-2.32)	0.49	(1.05)	-4.45	(-2.28)	0.57	(0.96)
Lumber	-2.35	7.71	.04	-2.72	(-2.88)	0.66	(2.93)	-2.70	(-2.97)	1.02	(3.67)
Copper	-1.56	5.45	-.05	-1.91	(-3.06)	0.63	(4.25)	-1.82	(-2.85)	0.75	(3.85)
Gold	-1.38	7.21	-.20	-1.71	(-1.92)	0.58	(2.76)	-1.62	(-1.81)	0.70	(2.56)
Platinum	-1.85	9.26	-.19	-2.33	(-2.08)	0.86	(3.22)	-2.17	(-1.90)	0.95	(2.72)
Silver	-1.68	11.69	-.23	-2.15	(-1.47)	0.85	(2.45)	-2.00	(-1.35)	0.95	(2.11)
Br. Pound	-0.89	3.57	-.06	-0.93	(-2.00)	0.08	(0.73)	-0.93	(-2.01)	0.14	(0.97)
Ca$	-0.13	1.35	-.03	-0.17	(-1.01)	0.08	(2.07)	-0.18	(-1.06)	0.15	(2.91)
Deutsch Mark	-1.25	3.21	.01	-1.30	(-3.10)	0.09	(0.87)	-1.29	(-3.09)	0.11	(0.90)
Swiss Franc	-1.20	3.41	-.09	-1.25	(-2.80)	0.08	(0.79)	-1.24	(-2.80)	0.11	(0.85)
Yen	-0.45	3.49	-.07	-0.50	(-1.11)	0.10	(0.89)	-0.50	(-1.10)	0.15	(1.06)
GNMA	0.10	3.37	-.04	-0.07	(-0.17)	0.31	(3.16)	-0.11	(-0.30)	0.61	(5.70)
T-Bill	0.02	0.29	-.12	0.01	(0.31)	0.02	(2.04)	0.01	(0.19)	0.05	(4.46)
T-Bond	0.01	4.17	-.03	-0.13	(-0.25)	0.40	(3.33)	-0.18	(-0.43)	0.82	(6.40)

by traders heavily margining their positions.

Especially noteworthy is the fact that none of the contracts exhibited any meaningful correlation with the inflation rate. Neither long nor short positions on any of the commodity or financial futures contracts would appear to provide any significant protection against purchasing power losses. In fact, even the well-publicized "inflation hedges" (gold, platinum, and silver) displayed **negative** correlation with the inflation rate over the time interval. These findings are consistent with those of Herbst [14].

Tables II through V display the matrices of correlation coefficients between the various contracts. The high correlation between several of the futures prices implies that several low-risk spreads can be created. For instance, the interest rate spreads would obviously be highly effective in reducing the risk of outright interest rate speculation. The high correlation between the precious metals demonstrates that low-risk spreads between these contracts can be constructed as well. Similarily, putting on the soy "crush" (buying soybeans and selling soymeal and soyoil) is clearly less risky than taking a single position on any of the soy contracts. Numerous other inter-grain spreads (such as the inter-wheat spreads) also appear to be of limited risk.

However, the large number of low correlation coefficients demonstrates that most inter-futures spreads would be very risky if held as isolated investments. For example, with the highest correlation between a commodity and a financial being .44 (gold and Swiss Francs), there does not appear to be any spreads between financials and commodities which might represent low-risk positions.

Table II

Correlation Matrix For Grains

	Corn	Oats	Soybeans	Soymeal	Soyoil	Hard Wheat	Soft Wheat	Spring Wheat
Corn	1.00	.54	.78	.74	.66	.58	.60	.61
Oats	.54	1.00	.63	.59	.53	.54	.60	.59
Soybeans	.78	.63	1.00	.91	.80	.63	.72	.68
Soymeal	.74	.59	.91	1.00	.69	.61	.68	.67
Soyoil	.66	.53	.80	.69	1.00	.52	.61	.59
Wheat (Hard Winter)	.58	.54	.63	.61	.52	1.00	.62	.80
Wheat (Soft Winter)	.60	.60	.72	.68	.61	.62	1.00	.75
Wheat (Spring)	.61	.59	.68	.67	.59	.80	.75	1.00
Cattle (Feeder)	-.01	.10	.01	.04	-.05	.13	.08	-.12
Cattle (Live)	.22	.14	.22	.24	.09	.01	.23	.10
Hogs	.29	.40	.44	.43	.32	.25	.38	.29
Pork Bellies	.25	.47	.43	.37	.29	.32	.43	.37
Cocoa	.15	.01	.22	.18	.15	.16	.19	.10
Coffee	-.09	.06	.01	.04	.03	.02	.01	.02
Cotton	.58	.19	.44	.42	.34	.32	.31	.30
Orange Juice	-.04	-.03	-.05	-.08	-.04	-.10	-.07	-.12
Sugar (World)	.05	.11	.14	.18	.05	.08	.16	.19
Lumber	-.06	.01	-.11	-.01	-.17	-.18	-.07	-.04
Copper	.29	.23	.42	.39	.30	.31	.44	.34
Gold	.12	.27	.28	.29	.25	.16	.23	.27
Platinum	.22	.36	.35	.29	.26	.13	.35	.22
Silver	.15	.30	.31	.24	.15	.15	.31	.24
Br. Pound	.08	.02	.13	.21	.09	.01	.11	.10
Ca$	-.12	-.06	-.01	.03	-.02	-.05	-.08	-.03
Deutsch Mark	.16	.20	.24	.28	.14	.26	.23	.15
Swiss Franc	.13	.27	.25	.30	.15	.24	.24	.18
Yen	.08	.19	.10	.13	-.02	.12	.16	.02
GNMA	-.24	-.14	-.24	-.26	-.14	-.27	-.24	-.24
T-Bill	-.30	-.14	-.22	-.24	-.01	-.31	-.27	-.28
T-Bond	-.31	-.17	-.28	-.23	-.20	-.29	-.28	-.28

Table III

Correlation Matrix For Other Agricultural Commodities

	Feeder Cattle	Live Cattle	Hogs	Pork Bellies	Cocoa	Coffee	Cotton	Orange Juice	World Sugar
Corn	-.01	.22	.29	.25	.15	-.09	.58	-.04	.05
Oats	.10	.14	.40	.47	.01	.06	.19	-.03	.11
Soybeans	.01	.22	.44	.43	.22	.01	.44	-.05	.14
Soymeal	.04	.29	.43	.37	.18	.04	.42	-.08	.18
Soyoil	-.05	.09	.32	.29	.15	.03	.34	-.04	.05
Wheat (Hard Winter)	.13	.01	.25	.32	.16	.02	.32	-.10	.08
Wheat (Soft Winter)	.08	.23	.38	.43	.19	.01	.31	-.07	.16
Wheat (Spring)	-.12	.10	.29	.37	.10	.02	.30	-.12	.19
Cattle (Feeder)	1.00	.78	.38	.23	.02	-.11	-.06	.07	.09
Cattle (Live)	.78	1.00	.41	.23	.09	-.09	.02	-.01	-.01
Hogs	.38	.41	1.00	.17	-.05	-.22	.14	.16	-.04
Pork Bellies	.23	.23	.17	1.00	.03	-.06	.08	.11	-.15
Cocoa	.02	.09	-.05	.03	1.00	.37	.01	.09	.16
Coffee	-.11	-.09	-.22	-.06	.37	1.00	-.25	.09	.24
Cotton	-.06	.02	.14	.08	.01	-.25	1.00	-.04	.11
Orange Juice	.07	-.01	.16	.11	.09	.09	-.04	1.00	.06
Sugar (World)	.09	-.01	-.04	-.15	.16	.24	.11	.06	1.00
Lumber	.15	.15	-.05	-.13	-.10	-.03	-.18	-.06	.38
Copper	.20	.16	.23	.33	.50	.17	.11	.02	.34
Gold	.10	.109	.38	.36	.21	-.11	-.11	-.20	.10
Platinum	.16	.11	.17	.22	.28	-.01	.01	-.23	.26
Silver	.16	.08	.26	.30	.30	.05	-.06	-.14	.28
Br. Pound	.06	.06	-.05	-.02	.11	.06	.20	.02	.22
Ca$	.18	.08	.07	.11	-.08	-.13	-.09	.01	.05
Deutsch Mark	.13	.22	.11	.15	.15	.24	.16	-.21	.02
Swiss Franc	.06	.07	.09	.17	.16	.16	.11	-.27	.11
Yen	.08	-.01	-.03	.01	.17	-.08	.08	-.05	.22
GNMA	.17	-.15	-.13	-.02	-.20	.15	-.20	-.08	-.05
T-Bill	.13	-.04	-.09	-.01	-.12	.21	-.29	.01	-.03
T-Bond	.12	.01	-.13	-.02	-.25	.08	-.25	-.11	-.05

Table IV

Correlation Matrix For Woods and Metals

	Lumber	Copper	Gold	Platinum	Silver
Corn	-.06	.29	.12	.22	.15
Oats	.01	.23	.27	.36	.30
Soybeans	-.11	.42	.28	.35	.31
Soymeal	-.01	.39	.29	.29	.24
Soyoil	-.17	.30	.25	.26	.15
Wheat (Hard Winter)	-.18	.31	.16	.13	.15
Wheat (Soft Winter)	-.07	.44	.31	.35	.31
Wheat (Spring)	-.04	.34	.27	.22	.24
Cattle (Feeder)	.17	.20	.17	.16	.16
Cattle (Live)	.15	.16	.10	.11	.08
Hogs	-.05	.23	.38	.17	.26
Pork Bellies	-.13	.33	.36	.22	.30
Cocoa	-.10	.50	.21	.28	.30
Coffee	-.03	.17	-.11	-.01	.05
Cotton	-.18	.11	-.11	.01	-.06
Orange Juice	-.06	.02	-.20	-.23	-.14
Sugar (World)	.38	.34	.10	.26	.28
Lumber	1.00	.29	.17	.28	.25
Copper	.29	1.00	.40	.53	.53
Gold	.17	.40	1.00	.85	.83
Platinum	.28	.53	.85	1.00	.85
Silver	.25	.53	.83	.85	1.00
Br. Pound	.13	.17	.34	.22	.28
Ca$	.20	.25	.34	.23	.24
Deutsch Mark	-.04	.28	.38	.25	.24
Swiss Franc	.02	.27	.44	.37	.34
Yen	.12	.14	.28	.20	.15
GNMA	.25	.05	.06	-.03	.01
T-Bill	.30	.14	.13	-.01	.02
T-Bond	.34	.02	.08	-.02	.01

Similarily, the correlation between the agricultural commodities and the other commodities is fairly low. In addition, the fairly low correlation between the grains and livestock, as well as between the various livestock contracts themselves, demonstrates that feed-livestock and inter-livestock spreads may not be much less risky than outright positions. Even certain inter-grain spreads, such as the famous corn-oats spread (Teweles, Harlow, and Stone [23]), does not seem to provide much risk reduction.

IV. Summary

The general findings indicate that, although futures contracts are not much more volatile than the average stock, numerous contracts do generate significant beta risk. In addition, although a few low-risk spreads can be created, the average spread is probably not much less risky than an outright position. Another important discovery is that futures contracts do not represent good hedges against inflation.

It was also found that most futures contracts generated negative excess returns over the sample interval, and that long futures investors in these contracts earned substandard returns. It should be emphasized, however, that this study has focused on long investments in futures contracts. Since the returns to short positions would have the opposite sign, it can be concluded that short investments in most futures contracts over the time interval would have earned positive abnormal returns.

Table V

Correlation Matrix For Financials

	Br. Pound	Ca$	Deutsch Mark	Swiss Franc	Yen	GNMA	T-Bill	T-Bond
Corn	.08	-.12	.16	.13	.08	-.24	-.30	-.31
Oats	.01	-.06	.20	.27	.19	-.14	-.14	-.17
Soybeans	.13	-.01	.24	.25	.10	-.24	-.22	-.28
Soymeal	.21	.03	.28	.30	.13	-.26	-.24	-.23
Soyoil	.09	-.02	.14	.15	-.02	-.14	-.01	-.20
Wheat (Hard Winter)	.01	-.05	.26	.24	.12	-.27	-.31	-.29
Wheat (Soft Winter)	.11	-.08	.23	.24	.16	-.24	-.27	-.28
Wheat (Spring)	.10	-.03	.15	.18	.02	-.24	-.28	-.28
Cattle (Feeder)	.06	.18	.13	.06	.08	.17	.13	.12
Cattle (Live)	.06	.08	.22	.07	-.01	-.15	-.04	.01
Hogs	-.05	.07	.11	.09	-.03	-.13	-.09	-.13
Pork Bellies	-.02	.11	.15	.17	.01	-.02	-.01	-.02
Cocoa	.11	-.08	.15	.16	.17	-.20	-.12	-.25
Coffee	.06	-.13	.24	.16	-.08	.15	.21	.08
Cotton	.20	-.09	.16	.11	.08	-.20	-.29	-.25
Orange Juice	.02	.01	-.21	-.27	-.05	-.08	.01	-.11
Sugar (World)	.22	.05	.02	.11	.22	-.05	-.03	-.05
Lumber	.13	.20	-.04	.02	.12	.25	.30	.34
Copper	.17	.25	.28	.27	.14	.05	.14	.02
Gold	.34	.34	.38	.44	.28	.06	.13	.08
Platinum	.22	.23	.25	.37	.20	-.03	-.01	-.02
Silver	.28	.24	.24	.34	.15	.01	.02	.01
Br. Pound	1.00	.44	.55	.51	.44	.24	.25	.22
Ca$	.44	1.00	.42	.46	.36	.32	.42	.42
Deutsch Mark	.55	.42	1.00	.87	.52	.13	.22	.15
Swiss Franc	.51	.46	.87	1.00	.49	.15	.26	.15
Yen	.44	.36	.52	.49	1.00	.15	.18	.16
GNMA	.24	.32	.13	.15	.15	1.00	.83	.88
T-Bill	.25	.42	.22	.26	.18	.83	1.00	.79
T-Bond	.22	.42	.15	.15	.16	.88	.79	1.00

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J. Austin Murphy is an Assistant Professor of Finance at Oakland University, Rochester, Michigan.