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Are investors' portfolios enhanced by incorporating CTA index funds?

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By exploring the CTA index with other representative indices across stock, bond, currency, futures, oil, gold and commodity markets, we reveal several impressive findings for the CTA index. First, an upward trend exists for the CTA index without obvious drops. Second, a lower correlation is shown between the CTA index and each of these indices without exceptions. Third, neither causality nor cointegration is revealed as well. The findings revealed above seldom coexist for other financial commodities, implying that investors are able to enhance their portfolios by incorporating CTA index funds according to the portfolio selection proposed by Markowitz (1952).

Keywords: managed futures funds; CTA index; correlation coefficients; asset allocation

JEL Classification: G10; G11; G15

I. Introduction

The MSCI world index fell 42%, commodity price index declined 46%, Credit Suisse high yield bond index dropped 26%, but the CTA index¹ raised 14% during the recent financial crisis rather impressive for investors. The above evidences arouse our interests to investigate the CTA index in depth, since the superior performance of the CTA index are revealed over recent decades, the period occurring several financial crises including 1998 East Asian Financial Crisis, 2000 Technical Bubble, and 2008 Financial Tsunami. However, the CTA index had raised 176% and 366% over the past 16 and 22 years before 2010.

By surveying the relevant studies, we reveal that the contagious effects among various stock markets (Eun and Shim, 1989; Chen *et al.*, 2011), diverse currency and stock markets (Kanas, 2000; Bubak *et al.*, 2011), a variety of commodity and stock markets (Chan, 1992;

Farooq *et al.*, 2005) and different futures and stock markets (Chan *et al.*, 1991; Chen and Gau, 2010; Wu *et al.*, 2011) are widely investigated in the relevant literature. We therefore explore whether the relationship between the CTA index and each of various representative indices in stock, bond, currency, futures, and commodities indices including the CTA index, JP Morgan global bond index, Credit Suisse high yield bond index, MSCI world index, US dollar index, oil price index, gold price index, CRB index, and UBS commodity index. We then reveal several impressive results. First, we find that an upward trend is shown for the CTA index without obvious drops over the period 1995 to 2010. Additionally, this finding is very impressive for investors because several financial crises occurred during this period. Second, a lower correlation coefficient, less than 0.3, is shown between the CTA index and each of these indices without exceptions. Third, neither Granger causality nor cointegration is

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¹ The full name of CTA is the Commodity Trading Advisor index, one of the managed futures indices.

revealed as well. These findings seem to rarely coexist in other financial instruments. Therefore, we argue that investors could incorporate CTA index funds into their portfolios, according to the portfolio selection proposed by Markowitz (1952).

The remainder of this article is organized as follows. Section II explains the data employed in this study. Section III presents the empirical results and analysis. Section IV concludes this article.

II. Data and Descriptive Statistics

We collect our data from Bloomberg over the period 1995 to 2010. We document that these indices should be important indices in the stock, bond, currency, futures, gold and commodity markets. Besides, these are several financial crises occurred during the data period, indicating that our studied results should not be dominated by a specified period (Schneeweis *et al.*, 2013).

We further plot these indices in Fig. 1, present the descriptive statistics of these indices in Table 1 and list the correlation matrix for these indices in Table 2.

Figure 1 shows that the CTA index has an upward trend without obvious drops. In addition, the volatilities of the CTA index are much lower than those of other indices. Besides, although the slope of the gold price is steeper than that of the CTA index, the gold price had stayed at a low level before 2000.

Table 1 shows the means, mediums, SDs, minimums and maximums for these index returns. In addition, we reveal that the mean CTA index return is higher than the median CTA index return, indicating that the CTA index return is rarely affected by the considerably negative shocks from several financial crises that occurred during the data period 1995 to 2010.

However, the medium returns of several indices, including the Credit Suisse high yield bond index, MSCI world index, US dollar index, CRB index and UBS commodity index are much higher than the mean returns of these indices, which might result from several black swan events that occurred from 1995 to 2000.

The results revealed in Table 2 should be very impressive for investors, since the correlation coefficient between the CTA index return and each of these index returns is less than 0.3 without exceptions. We document that investors' portfolios are likely to be enhanced by incorporating CTA index funds, as the portfolio selection suggested by Markowitz (1952).

III. Empirical Results of Time Series Models

In order to explore the CTA index in depth, we further explore whether short-run or long-run relationships exist between CTA index and each of these indices by time series approaches. To begin with, we use the log differencing series for the representative indices due to

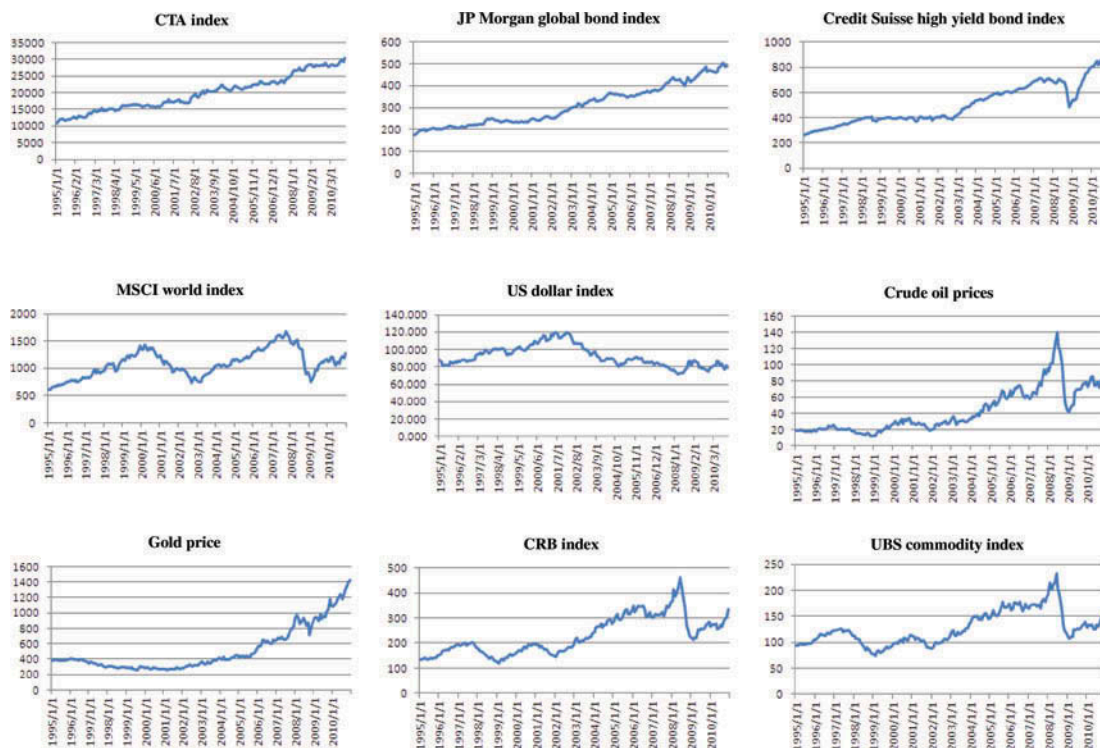


Fig. 1. The trends of nine financial indices

Table 1. Descriptive statistics

Financial indices	Obs.	Mean	Medium	SD	Min	Max
CTA index return	192	0.0055	0.0037	0.0220	-0.0477	0.0645
JP Morgan global bond index return	192	0.0056	0.0052	0.0178	-0.0387	0.0656
Credit Suisse high yield bond index return	192	0.0069	0.0094	0.0251	-0.1584	0.1008
MSCI world index return	192	0.0049	0.0108	0.0458	-0.1904	0.1090
US dollar index return	192	-0.0003	-0.0006	0.0240	-0.0622	0.0778
Crude oil return	192	0.0131	0.0171	0.0950	-0.3262	0.3659
Gold return	192	0.0079	0.0036	0.0454	-0.1784	0.1605
CRB index return	192	0.0059	0.0095	0.0482	-0.2232	0.1378
UBS commodity index return	192	0.0038	0.0052	0.0464	-0.2134	0.1298

Table 2. Correlation matrix

Indices and prices	CTA	GB	HY	WS	UD	OIL	GOLD	CRB	UBS
CTA index (CTA)	1.00								
JP Morgan global bond index (GB)	0.29	1.00							
Credit Suisse high yield bond index (HY)	-0.10	0.16	1.00						
MSCI world index (MS)	-0.02	0.19	0.64	1.00					
US dollar index (UD)	-0.16	-0.83	-0.25	-0.34	1.00				
Crude oil price (OIL)	0.11	0.10	0.21	0.23	-0.26	1.00			
Gold price (GOLD)	0.23	0.40	0.11	0.09	-0.41	0.20	1.00		
CRB index (GRB)	0.22	0.20	0.33	0.37	-0.38	0.84	0.33	1.00	
DJ-UBS commodity index (USB)	0.28	0.25	0.33	0.39	-0.41	0.74	0.39	0.96	1.00

stationary concerns, and then select lag 1 as the lag length for these VAR models, according to the AIC criterion. Afterwards, we investigate the relationship between the CTA index and each of these representative indices using VAR models² as a result of no cointegration, as confirmed by Johansen cointegration tests in Table 3.

The VAR models are shown below:

$$\Delta X_t = \alpha_1 + \sum_{i=1}^p \beta_{11} \Delta X_{t-i} + \sum_{i=1}^q \beta_{12} \Delta Y_{t-i} + \varepsilon_t$$

$$\Delta Y_t = \alpha_2 + \sum_{i=1}^p \beta_{21} \Delta X_{t-i} + \sum_{i=1}^q \beta_{22} \Delta Y_{t-i} + \varepsilon_t$$

where the ΔX is the log difference series for the CTA index, and the ΔY is the log difference series for each of our selected indices. In this study, the lag length selected for these VAR models is 1 in accordance with the AIC criterion.

Table 4 reveals that there is no Granger causality relationship between the CTA index return and each of these index returns without exceptions, which is also quite notable to investors. In addition, we employ bivariate GARCH models to examine whether the causality still exists

Table 3. Johansen cointegration tests

		Atrace	λ max
JP Morgan global bond index	$r = 0$	13.7829	13.4098
	$r \leq 1$	0.3731	0.3731
Credit Suisse high yield bond index	$r = 0$	6.4218	4.9981
	$r \leq 1$	1.4236	1.4236
MSCI world index	$r = 0$	3.8282	3.8269
	$r \leq 1$	0.0013	0.0013
US dollar index	$r = 0$	3.9096	3.8403
	$r \leq 1$	0.0693	0.0693
Crude oil price	$r = 0$	7.1971	7.1428
	$r \leq 1$	0.0543	0.0543
Gold price	$r = 0$	25.6458	17.7874
	$r \leq 1$	7.8584	7.8584
CRB index	$r = 0$	3.4325	3.4318
	$r \leq 1$	0.0007	0.0007
USB commodity index	$r = 0$	3.4251	3.4243
	$r \leq 1$	0.0007	0.0007

between the CTA index return and each of these index returns, since the clustered volatilities exist in these index returns as well. In order to save space, we present the VAR results only, since the causality results revealed by the bivariate GARCH models are almost the same as those revealed by the VAR models.

² The lag lengths for the VAR models employed in this study are all selected as lag one in accordance with the statistics of AIC lag length tests.

Table 4. Granger causality results

	(1)		(2)	
	H ₁ : ΔY_{t-i} Granger-causes ΔX_t		H ₂ : ΔX_{t-i} Granger-causes ΔY_t	
	<i>F</i> -statistics	<i>p</i> -Values	<i>F</i> -statistics	<i>p</i> -Values
JP Morgan Global bond index	3.2488	0.0731	1.1748	0.2798
Credit Suisse high yield bond index	0.0260	0.8720	0.3640	0.5470
MSCI world index	1.6132	0.2056	0.9568	0.3293
US dollar index	2.5768	0.1101	1.2904	0.2574
Crude oil price	1.3918	0.2396	1.8532	0.1750
Gold price	0.4144	0.5205	0.7571	0.3854
CRB index	0.3176	0.5737	2.2782	0.1329
UBS commodity index	0.3848	0.5358	2.8207	0.0947

Notes: Column (1) reports the *F*-statistics and *p*-values of Granger causality for the ΔX series to the ΔY series, and Column (2) presents the *F*-statistics and *p*-values of Granger causality for the ΔY series to the ΔX series.

In sum, we reveal that the CTA index has an upward trend without apparent drops over the data period; the correlation coefficient is less than 0.3 between the CTA index and each of these indices, and neither causality nor cointegration relationship is revealed in this study. These results are rarely coexisted in other financial instruments. Therefore, we argue that market participants are able to enhance their portfolios by incorporating CTA index funds.

IV. Conclusions and Suggestions

How to enhance the performance of investors' portfolios would be a worthwhile topic for investigation, since many market participants suffer losses and even huge losses during the recent financial tsunami. In this study, we reveal that investors might take the CTA index funds into account while constituting or modifying their portfolios.

In this study, we reveal several impressive results, which might provide more convincing evidences for market participants. First, an upward trend is revealed for the CTA index without obvious drops over the period 1995–2010, in spite of several financial crises occurred during this period. Second, we show that the correlation coefficient is less than 0.3 between the CTA index return and each of these representative index returns. Third, we disclose that neither a short-term nor a long-term relationship is revealed between the CTA index and each of these indices without exceptions. We argue that these findings are seldom revealed by other financial commodities. Therefore, we suggest that investors might incorporate the CTA index funds into their portfolios

according to the portfolio selection proposed by Markowitz (1952), as the above impressive evidences revealed in this study.

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