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Diversification benefits of commodity futures

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ABSTRACT

The finance literature seems to be in support of the diversification benefits of adding commodity futures to an existing portfolio. Yet no empirical work has been performed to test whether the benefits are indeed statistically significant. This paper addresses several unresolved issues concerning the potential diversification benefits of commodities. First, we attempt to ascertain whether the alleged diversification benefits exist and are statistically significant. Second, to what extent are the diversification benefits unique to US investors? Would investors of a resource-based economy like Canada also benefit from adding commodities to their portfolios? Third, recent studies indicate that correlations among international equity returns are higher during bear markets than during bull markets. This type of regime-switching correlation behavior will mean lower diversification benefits from international investments when investors face a bearish environment at home. Do commodity futures display the same type of regime-switching behavior? To what extent do commodity futures offer real diversification benefits that are robust over time and across regimes? Finally, commodities may appear to be an asset for the more adventurous investors with higher risk tolerance. We want to know what type of investors should hold commodities. We demonstrate that the diversification benefit of commodities is a far more complex phenomenon than often understood in the finance literature.

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1. Introduction

Alternative investments such as hedge funds and commodities have been increasingly popular with investors. While hedge funds have been extensively studied in the academic community, commodities

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do not appear to receive the same type of attention.¹ This lack of attention continues in spite of the recent availability of commodity-related investment products to retail investors. There are currently more than a hundred exchange-traded funds (ETFs) specializing in a variety of commodities ranging from the ETFs that cover a general commodity index to those that specialize in a single commodity such as oil, natural gas, or gold.² Perhaps the basic question that should be asked by an investor is whether commodities as an asset class will improve the risk-return characteristic of an existing portfolio.³

Existing finance literature seems to suggest that commodity futures will improve the risk-adjusted return for investors. Bodie and Rosansky (1980) report that switching from an all-stock portfolio to a portfolio with 40% in commodity futures and 60% in US stocks could reduce the overall risk without sacrificing returns based on data from 1950 to 1976. Jensen et al. (2000) offer evidence on the diversification benefits of commodities to a US investor holding a benchmark portfolio of US stocks, US bonds, US T-bills, and US real estate. Gorton and Rouwenhorst (2006) document that commodity futures offer the same mean return and Sharpe ratio as US equities but with negative correlations with US stocks and bonds based on data from 1959 to 2004. Commodity futures therefore “have been especially effective in providing diversification for stock and bond portfolios” (p.60). By also examining the Japanese data, Gorton et al. (2005) generalize the US conclusion to Japanese investors. Since commodity futures deliver mean returns comparable to those of Japanese equities while having zero and negative correlation with Japanese equities and bonds respectively, they infer that commodity futures also perform wonders for Japanese portfolio investors. In contrast to the passive commodity indices used in the above studies, Edwards and Park (1996) offer evidence on the diversification benefits of actively managed commodity futures when added to a conventional portfolio of US stocks and bonds. It appears in the finance literature that the diversification benefits of commodity futures should be a universally accepted dogma.

There are, however, several problems in the literature that preclude a quick and easy conclusion. Gorton et al. (2005) based their conclusion on the input parameters such as returns and correlations of various asset classes without even attempting any construction of optimal portfolios. While input parameters of individual asset classes play a critical role in determining the risk-return characteristics of a *portfolio*, it is ultimately the portfolio that matters. Conclusions regarding the desirability of a new asset class must therefore be based on the risk-return characteristics of the resulting portfolio. Bodie and Rosansky (1980) only conduct a crude numerical portfolio “optimization” to demonstrate the diversification benefit of commodity futures. Jensen et al. (2000) plot the efficient frontier of their benchmark asset classes and the frontier of the benchmark asset classes together with commodity futures. Their conclusion is then based on a visual inspection of the two frontiers. In the case of the study by Edwards and Park (1996), their database on actively managed futures contains two possible biases as recognized by the authors themselves. First, there is a self-selection bias arising from the inclusion in the database of performance records of managed funds prior to their registering with the Commodity Futures Trading Commission (CFTC). There is substantial evidence suggesting that the proprietary returns of managed funds prior to their acceptance of public moneys are significantly upward biased. Second, there is the usual survivorship bias as non-surviving funds may be excluded from the database. Our concern here is the potential diversification benefits of commodity futures as an asset class rather than the comparison of the performances of active and passive management. We therefore rely on passive indices as our proxies for commodity futures to avoid any potential biases.

More importantly, all the above authors fail to perform any statistical test on the increase in risk-adjusted returns. It is well known that any in-sample performance analysis (such as those conducted by Bodie and Rosansky, and Jensen, Johnson and Mercer, and Edwards and Park) ought to result in a

¹ The academic literature on commodities tends to use the futures contracts as proxies for the asset class. Physical commodities are costly to store and harder to trade and therefore may not be suitable as an investment asset. We follow this practice in this paper.

² See Domanski and Heath (2007) for some empirical evidence on the growing significance of financial investors in the commodity futures markets.

³ The pricing of commodity futures and the existence of a risk premium commonly known as normal backwardation or contango have been quite extensively investigated. Whatever the nature of the return on commodity futures, its desirability for inclusion in an investor's portfolio has been overlooked.

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