ENHANCING ENERGY SECURITY THROUGH FINANCIAL MARKETS' TRADING: A BRIDGE FOR ENERGY TRANSITION

Athanasios Rentiniotis, Department of Mechanical Engineering, University of Western Macedonia, arentiniotis7@gmail.com
Efstathios Konstantinidis, Department of Mechanical Engineering, University of Western Macedonia, ekonstantinidis@uowm.gr

Overview

The need for accessible and affordable energy is invasive in today's volatile, uncertain, complex, and ambiguous world stage. Europe in particular, as a major consumer of imported energy, has frequently borne the financial, social, and geopolitical consequences of energy dependency. Although major steps have been taken in recent years and relevant technologies such as renewable energy sources, energy storage systems, hybrid-electric vehicles, and even novel nuclear technology are in various stages of maturity, the question of energy security remains as relevant as in the winter of 1973, aptly demonstrated during the 2022 resumption of hostilities in Ukraine and the resulting energy crisis (Bouazizi et al., 2024). However, energy security may be elusive to a universally acceptable definition (Azzuni and Breyer, 2017). Existing energy technologies, green or otherwise, cannot hitherto replace imported energy in the framework of internationally connected financial markets, nor can they effectively do so during periods that crises – energy, financial, or geopolitical – erupt and escalate. The present paper proposes an alternative approach to the pursue of energy security, through direct active participation in global energy financial markets, not with the intention of merely hedging risk exposure, as often practiced at the organisational and (supra)national level, but to actively trade relevant underlying commodities and financial products with the aim of securing net profit. Such financial gains can serve to cushion escalating energy costs during crises and effectively dampen energy price shocks, thus materially contributing to the protection of respective national economies, socioeconomic cohesion and social peace, and even, assist in hedging geopolitical risk to (supra)national sovereignty by mitigating the spectre of energy insecurity utilised as a direct or potential threat to enforce conformity (Sovacool, 2012).

Methods

The present work employs a quantitative approach to develop and evaluate a systematic trading strategy and analyse the potential for deriving financial profit from direct participation in international energy financial markets. The strategy focuses on natural gas futures contracts, in particular the NG=F continuous front-month futures contract traded in the New York Mercantile Exchange (NYMEX). NG=F price movement closely follows the actual price of natural gas by reflecting the price of the NYMEX natural gas futures contract closest to expiration. It is a highly liquid financial instrument, and due to its integral automatic roll-over, a few days prior to the actual expiration of the closest-to-expiration-date natural gas futures contract, the risk of actual expiration and consequent physical delivery of the underlying asset is negated. The proposed strategy consists of opening a Buy position in the NG=F continuous front-month futures contract at the Close price just prior to the end of a trading session, if the Close price is lower than the Close price of the previous session. The position is closed at the end of the next trading session, at the next Close price. Effectively, the proposed strategy is a systematic implementation of the "Buy Low" principle of trading, counting on the nature of the underlying commodity to achieve a profit when closing-selling the position opened earlier when the Close price decreased. As natural gas is a preferred fuel due to its properties, versatility, ease of use and transportation, price pull-backs are frequently "bought-into" as they present opportunities for buyers/consumers to achieve a lower price. Although this strategy approach may appear controversial due to its contrarian nature, it can prove to be quite effective, as will be shown. The strategy was implemented in a custom-written algorithm (Python 3.11.9) utilizing NG=F market price data, which are freely available online through open-access databases such as Yahoo! Finance.

Results

Backtesting the proposed strategy on NG=F from January 4th, 2010, with an allocated initial capital equal to 10,000 USD ($), the proposed strategy accumulated a total capital of 95,844.51 USD ($) by the end of 2024 for a total returns' percentage equal to 858.45% after a period of extensive growth, as shown in *Figure 1*. Over a period of 15 years, 1944 trades were taken, of which 987 were closed for a profit, and 957 were closed at a loss, representing a win rate equal to 50.77%. During the aforementioned period, there were 3773 trading days, during which the markets were open and active, thus we conclude that there was approximately 1 trade every 2 trading days. A "Buy-and-Hold" strategy over the same time period would result to a net loss, as 10,000 USD ($) invested in NG=F and held until 31/12/2024 would result to a total of 6,174.37 USD ($), thus incurring a loss of 3,825.63 USD ($),

amounting to a negative total returns performance equal to -38.26 %. Thus, considering the large number of trades and extensive backtesting period, it can be deducted that the proposed strategy clearly outperforms the benchmark "Buy and Hold" strategy, despite the considerable volatility exhibited by the price of the underlying commodity (natural gas) and the financial instrument utilised (NG=F). Furthermore, the proposed strategy on NG=F considerably outperforms the returns of the Standard & Poor's 500 (S&P500) index, routinely utilized as an enduring investment performance benchmark, over the aforementioned time period.

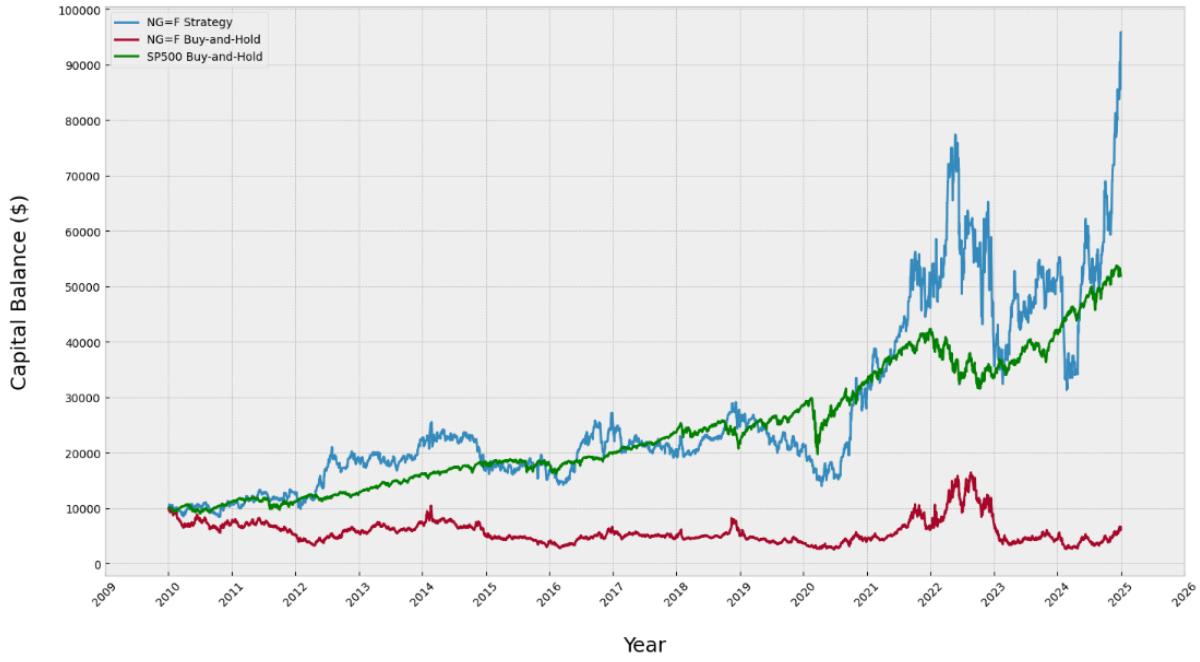

Figure 1. Accumulated capital of the proposed strategy implemented on NG=F compared to the accumulated capital for Buy-and-Hold strategies on NG=F and S&P 500 financial instruments.

Conclusions

Energy security remains an ever-present challenge, despite the great efforts and investment afforded to its mitigation. As global energy demand is projected to continue increasing for the foreseeable future, mirroring the increase in living standards and human population worldwide, it is exceedingly probable that the upward trend of energy prices will persist. Heightened geopolitical tensions, such as the ones already witnessed in Eastern Europe, Middle East, Africa and beyond, can exacerbate energy insecurity on a global scale, feeding into the aforementioned price effect and in turn, being amplified by them, in a vicious cycle of escalation. Although the proposed trading strategy cannot negate such effects single-handedly, arguably no solution can. Far from being a silver bullet, the proposed strategy can serve as a useful arrow in the quiver of any aware institution or (supra)national entity seeking realistic, if imperfect, solutions to the pressing problem of escalating energy costs and consequent energy insecurity. The proposed approach offers a major advantage, in that it requires little in the way of innovation and is highly flexible. Financial infrastructure required for financial trading is simple, mature, stable, and present worldwide. Any profits resulting from the implementation of such financial strategies would already be in cash or cash-equivalent form, and thus can easily be directed to any priority need at will, whether it is support of energy infrastructure, research on new technologies aimed at green energy production and storage, or supporting the energy burden of society's less fortunate. Finally, the proposed approach aims to further democratize financial and energy markets in the interests of the many, that ultimately form the backbone of developed societies.

References

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