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## Fractional co-integrated vector auto regression (FCVAR) methods: An application between energy and stock markets

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Market series' univariate dependencies, both objective and chock persistent can be effectively, explained by long-memory fractionally integrated models. For now, the ex-post difference, or the variance swap payoff reflecting the return bearing reward, displays far less persistent dynamics. In this respect, a process based on inference a fractionally co-integrated (or co-fractional) vector autoregressive process will be employed in this work while relying on an initial value conditional Gaussian likelihood. Indeed, applying some developed countries data oil-price and stock-market coupled with frequency domain methods, we undertake to dislocate the series into various parameters. Actually, our reached conclusions are discovered to be consistent with generalized long-run processes and help well provide some plausible explanations of the major why classical efforts of reasons lying behind the classical efforts' failure to establish a naive return-series relationship. In addition, a fractionally co-integrated vector auto-regression (FC-VAR) has also been estimated as part of this work. In effect, the long-run equilibrium relationship process established between the five indices has yielded a non-trivial return predictability over monthly horizons, which sustains the fact that a co-integrating relationship among the five indices turns out to help greatly in measuring proxies pertaining to for the financial market-satisfies uncertainty.

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## Catalvalor: A sustainable solution for biodiesel production from wastes

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Nowadays, social and economic demands as well as environmental concerns call for the development of alternative and sustainable renewable energies. More rigid government regulations and full or partial tax exemption are established to promote the utilization of sustainable fuels and biodiesel is one of the most interesting things from an environmental point of view. However it is necessary to solve the major obstacle in its commercialization, its current high cost of manufacturing. The cost of the oil feedstocks (food-grade oils) and the complexity of the conventional production processes escalate the overall biodiesel production costs and it is the major reason for its non-competitiveness when compared with diesel fossil fuels. INNOVCAT developed a new sustainable solution to transform wastes (oils and fats) into biodiesel. The catalvalor project combines an innovative Catalyst (X-CAT) and technology to produce biodiesel from wastes. Our catalyst is solid and prepared from a renewable source, is non-toxic, non-corrosive and when combined with a simplified process allows the transformation of a wide variety of waste feedstocks (from 1-100 % FFA content) into high quality biodiesel without loss of activity and with a superior efficiency avoiding complex pre-treatment steps, complicated separation, purification steps and generation of large amount of waste water stream. This is an outstanding solution to solve the problems of non-competitiveness of biodiesel and unique in the market that offers to biodiesel producers the possibility to reduce the operation costs (reduction in feedstock costs) and also reduction in the equipment process costs since it avoids all the complicated steps associated to biodiesel production processes.

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