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AN EXPANDING MARKET UNIVERSE

Inclusion Criteria for Diversified Systematic Portfolios as Illustrated on Generic Trend-Following

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Abstract

Portfolio diversification depends, amongst other factors, on a well diversified market universe. In this note we revisit markets across macro sectors - equities, fixed income, foreign exchange and commodities - and evaluate the benefit of including them in a systematic trend-following portfolio, keeping in mind constraints such as sufficient price history and market liquidity.

1. Introduction

Diversification in the context of systematic trading can mean many things. Systematic strategies can achieve diversification by trading a variety of 'signals', over different time horizons, and - last but not least - different assets. By investing in assets that are not perfectly correlated, we can reduce overall levels of portfolio risk, leading to a better risk-return tradeoff. The challenge is to find such assets that are not highly correlated. Trading the most liquid global macro markets across diverse sectors such as equities, fixed income, foreign exchange and commodities gives us exposure to a large portion of risk factors.

As illustrated in Tricker and Mitchell (2017)¹ using a simple trend-following strategy, we can increase the information ratio (IR) dramatically by adding more markets to our strategy, but only up to a certain point.

In Tricker and Mitchell (2017) we find that performance plateaus after about sixty markets, simply because more is not necessarily better, or to be more precise, 'different' markets are not so different after all if we consider their correlations. In this note, we repeat the same exercise, with the goal of identifying potential new markets to add to our market universe. We pay attention to liquidity, price history, and diversification potential. Other important considerations are trading costs - which often increase with decreased liquidity - and regulatory constraints; these fall outside the scope of this paper.

2. Different Markets – Same Constraints

To test the impact of the addition of new markets to a portfolio of the most liquid global macro markets, we

construct an expanding trend-following portfolio. We use a generic (20,120) moving average trend-following model, loosely reflecting the SG Trend Indicator, and add markets in order of liquidity (setting the minimum portfolio size to ten), where we define liquidity as the product of dollar big point value \times price change volatility \times volume:

$$\text{Liquidity} = \text{DBPV} \times \sigma(\Delta P) \times \text{volume}$$

For the purposes of this analysis, we run the backtest from 2000 using gross daily returns (and excluding the impact of slippage and transaction costs), with markets added as soon as a trend-following signal can be established. Initially we see performance improve significantly as the market universe increases: see Figure 1 where IR is plotted against the number of markets traded, a total of 140 markets in our study.

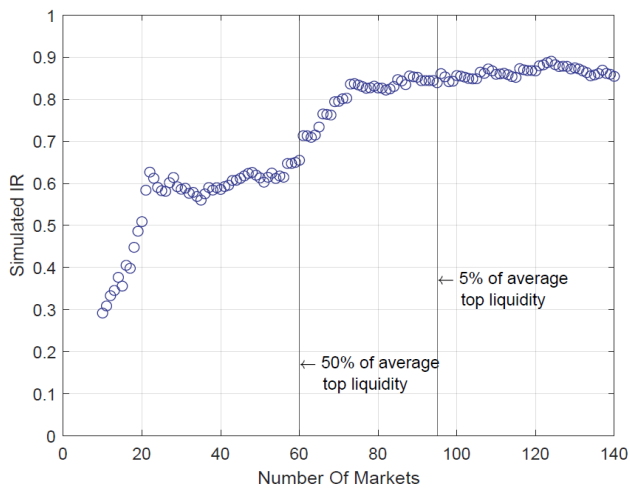


Figure 1. As markets are added to a portfolio, the IR increases. The increase is initially rapid, but eventually we hit an IR ceiling where trading more markets does not improve performance.

The IR flattens between 20 to 50 markets, to then increase further as we reach a universe comprised of about 70 to 80 markets. Beyond this point, we observe limited benefit: while we may nominally be trading more markets, these do not capture risk factors that are not already contained in the portfolio. In Figure 1, we also indicate liquidity thresholds corresponding to 50% and 5% of the average liquidity of the top 50 most liquid macro markets. These thresholds are reached at

approximately 60 and 95 markets, respectively. This illustrates that, beyond the first 50 markets, additional inclusions rapidly exhibit substantially lower liquidity, and by around 95 markets the associated liquidity is very limited.

Liquidity is not the only consideration when deciding which markets to trade as part of a trend-following portfolio. In Table 1, we tag the markets for which the price history starts in 2015 or later. These are markets that five years ago would have had a potentially too limited history to consider for inclusion in a systematic trading strategy, since a reasonable length backtest is usually required to assess model robustness for the market in question. As Table 1 shows, about a dozen of the markets have quite limited price history, the majority of them commodities, though we also find an equity market in this set (FTSE Taiwan).

| Market | Liquidity Rank | Price History Start Date |
|------------------------|----------------|--------------------------|
| INE Crude Oil | 63 | 2018 |
| CME Ether Futures | 68 | 2018 |
| FTSE Taiwan | 79 | 2020 |
| Fuel Oil | 82 | 2019 |
| TSR 20 Rubber | 86 | 2020 |
| Ethenlybenzene | 103 | 2020 |
| Kraft Pulp | 105 | 2019 |
| Canadian 5Yr | 115 | 2021 |
| Stainless Steel | 120 | 2020 |
| Paraxylene | 127 | 2024 |
| Low Sulfur Fuel Oil | 128 | 2020 |
| Polyester Staple Fiber | 131 | 2021 |
| Bonded Copper | 139 | 2021 |

Table 1. Many markets that might be contenders for an expanded universe based on their liquidity have limited price history available.

Turning to the diversification potential of the new markets, we run the same backtest on subsets of the latter. Figures 2 and 3 show the IR as a function of portfolio size when we add new global financial and commodity markets, respectively. Aside from there being slightly more contenders in the commodity set, a stark difference between the two sets is their impact on our backtested IR. While the commodities have diversifying potential, the financial markets do not. This

is a reflection of the more idiosyncratic returns of commodity markets versus the high correlation amongst global financials in general, where the most liquid financial futures and FX markets capture the bulk of the risk in this asset class.

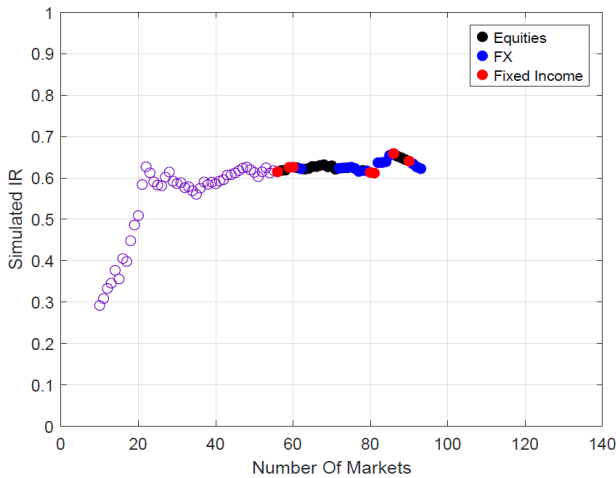


Figure 2. IR impact as new financial markets are added to a global macro trend-follower.

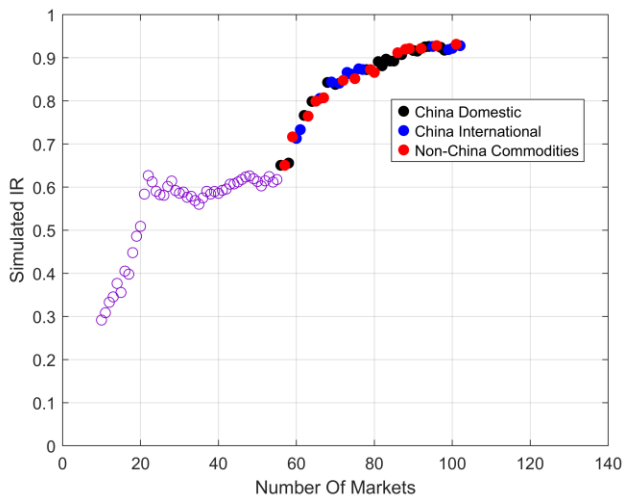


Figure 3. IR impact as new commodity markets are added to a global macro trend-follower.

We touched on the importance of liquidity when evaluating markets to be included in the portfolio. This is in order to ensure that adding the new market has the potential to make an impact at the trading size

required (which can be of the order of several hundred million dollars or above). In our simple trend-following model we do not include any market bounds (or other constraints), while in reality we would of course need to reflect the limited liquidity by tightening contract bounds for the respective markets. The performance increase we see in Figure 3 is therefore overly optimistic. To mimic the inclusion of reasonable bounds, we can mute the P&L effect of illiquid markets by scaling down the respective market P&L with a factor tied to its liquidity. Figure 4 illustrates the impact on the IR of this muting of P&L.

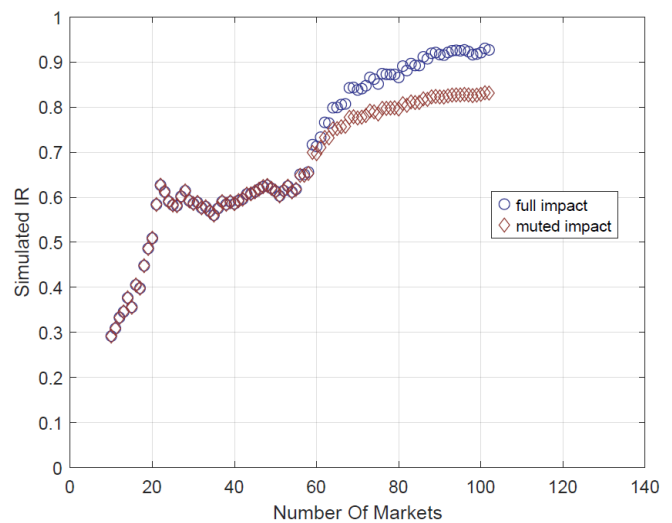


Figure 4. The positive IR impact of the new commodity markets is muted when taking into account decreased liquidity.

3. Conclusion

When looking for diversification opportunities, an increase in the asset universe needs to follow careful considerations. Once markets with sufficient price history to allow for the generation of systematic signals have been identified, their liquidity profile is assessed. If deemed acceptable, new markets may earn their inclusion in an existing trend-following portfolio if they complement the original risk factors.



REFERENCES

¹ E. Tricker and M. Mitchell. Market Diversification. Research Note, Graham Capital Management, August 2017.

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