Trading Alphas - Capstone Project Problem Statement

In order to apply all we have learned so far, let's create a project that combines a range of Alphas to produce. We will start from a highly diversified portfolio consisting of the following assets:

- Mini-S&P500 futures
- WTI oil futures
- Gold futures
- Aluminium futures
- EUR/USD currency
- Wheat futures
- VIX futures
- Gasoline futures

If you haven't worked with futures, then you can also select any ETFs or stocks of your choice.
Research and apply at least 4 micro-alphas to each of those contracts. Since the portfolio is highly diversified, it is expected that each contract will require very different alphas. Be sure to include at least four types of inefficiencies and 3 categories of alphas in total. At least one alpha should be based on machine learning signals.
The training data ends on 1 Jan 2020. After that date, many markets entered a very different economic regime.

1. After you have done your research, will your researched strategies still deliver acceptable performance from 2 Jan 2020 onwards?
2. What benchmark will you use or construct to evaluate your performance? Why did you choose this benchmark?

Note: While equities have a more asymmetric return profile, many futures and currency contracts are "zero-sum games" with a much more symmetric behaviour. Therefore, keep in mind that, unlike equities, they may trade equally well on the long and the short side, and some may actually trade better on the short side.
Since the main focus of this exercise is micro-alpha research, we are making the following assumptions:

1. Realistic futures contracts have different trading mechanics to equities. They usually have a dollar value assigned to each tick, which can vary greatly. We will ignore this fact for the sake of this exercise and research them in the same way as we did previously with equities. Please feel free to extend your research to account for that fact to make the model more realistic. Dollar values for each tick for individual contracts can be found on the Yahoo Finance website.
2. Furthermore, Yahoo Finance provides price data for "continuous" futures contracts. In reality, futures have a range of expiries, and the price for each expiry is different due to "carry". For example, an oil contract which expires in two years would be more expensive than the same contract with a 3 months expiry because of storage costs incurred by the counterparty. Continuous contracts only regard the price of the front month and back-adjust the difference when the front month expires and is rolled into the next contract. We will ignore this in our simulation, but we need to be aware that this could affect our results in real-life trading.
3. Transaction costs can vary greatly for each of the contracts. We will only apply a simple transaction cost model in our research.

Once your simulation is ready, run a study of transaction costs. For simplicity, apply the same level of transaction costs to each contract. And answer the following questions.

1. What is the highest level of transaction costs your strategy can tolerate?
2. Could this be improved by reducing the turnover?
3. How much leverage would you tolerate?

Now apply your strategy to the out-of-sample data 2020-onwards.

1. Does the strategy still hold in the new market regime?
2. Is it still viable after transaction costs?

Reflect on what you have learned. Write down at least 10 insights from your research.