SAN JOSE STATE UNIVERSITY

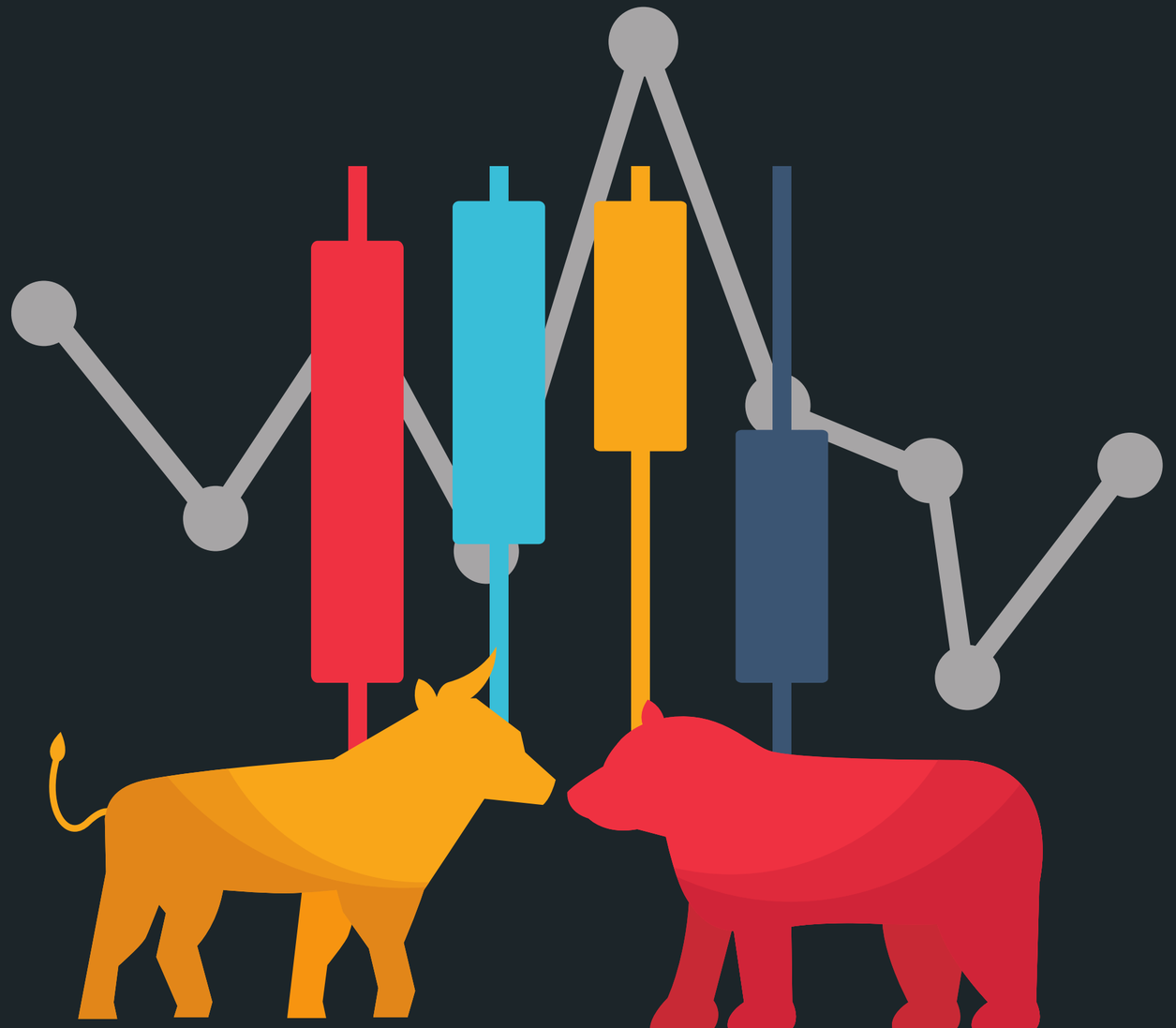
CMPE 260

FALL 2021

STOCK MARKET PREDICTOR

Using Temporal Difference

OUTLINE



AGENDA

Team Members

Problem Statement

Motivation

Methodology

Implementation

Results

Technical Walkthrough

THE TEAM

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SAMER BASLAN

PROBLEM STATEMENT

STOCK MARKET PREDICTION USING DEEP REINFORCEMENT LEARNING

Create a reinforcement learning agent to perform stock trades with a goal of maximizing returns using technical indicators and historical data similar to how a professional stock trader.

“

If you don’t find a way to make money while you sleep, you will work until you die.

WARREN BUFFETT

MOTIVATION

Reinforcement Learning (RL) is the perfect framework to tackle the adversarial nature of the stock market. As long as the environment can be adequately modeled, an RL agent can learn a policy that seeks to maximize the rewards

METHODOLOGY

CUSTOM GYM ENVIRONMENT

- Rich state information to include price/volume as well as a wealth of technical indicators.
- Agent actions to include Buy, Hold, Sell.
- Accurate rewards to simulate a fiscal quarter, taking into account trading costs and time penalty.

TRADING AGENT

- Double Deep Q-Learning Network (DDQN) agent with an Epsilon-Greedy policy.

IMPLEMENTATION

1 DATA ACQUISITION

Acquired historical stock market data through Nasdaq Data Link, with U.S. stock prices dating back to 1962.

2 ENVIRONMENT MODELING

Created a custom gym environment, leveraging an open-source python library to calculate technical indicators for the state information.

3 CREATING THE AGENT

We use a Double Deep Q-Learning Network (DDQN) agent

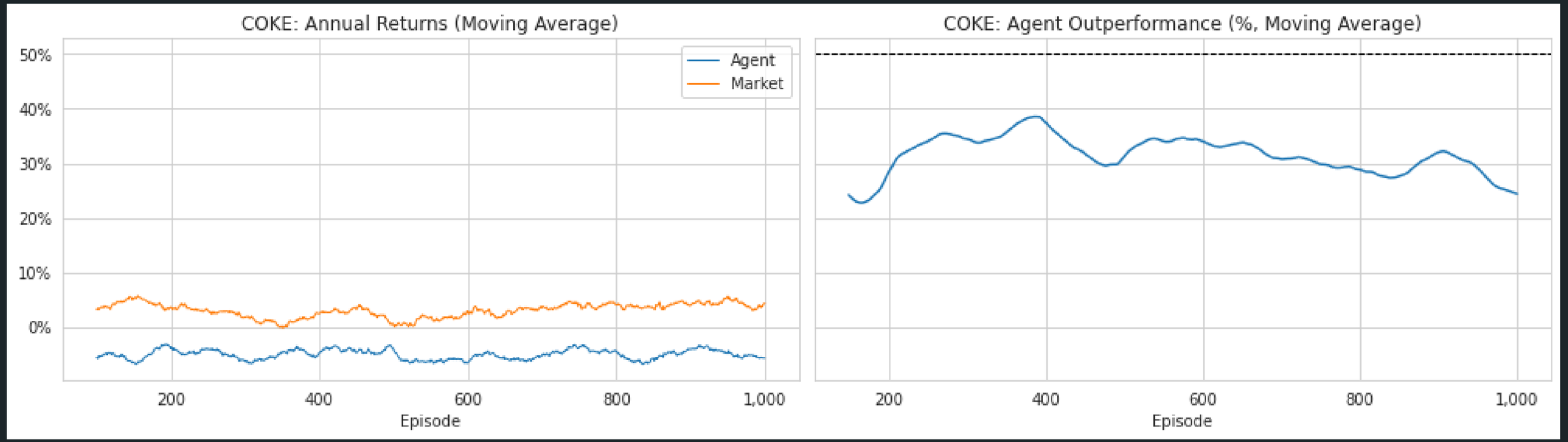
4 COMPARING POLICIES

comparing agent performance with and without the epsilon-greedy policy against market performance

RESULTS

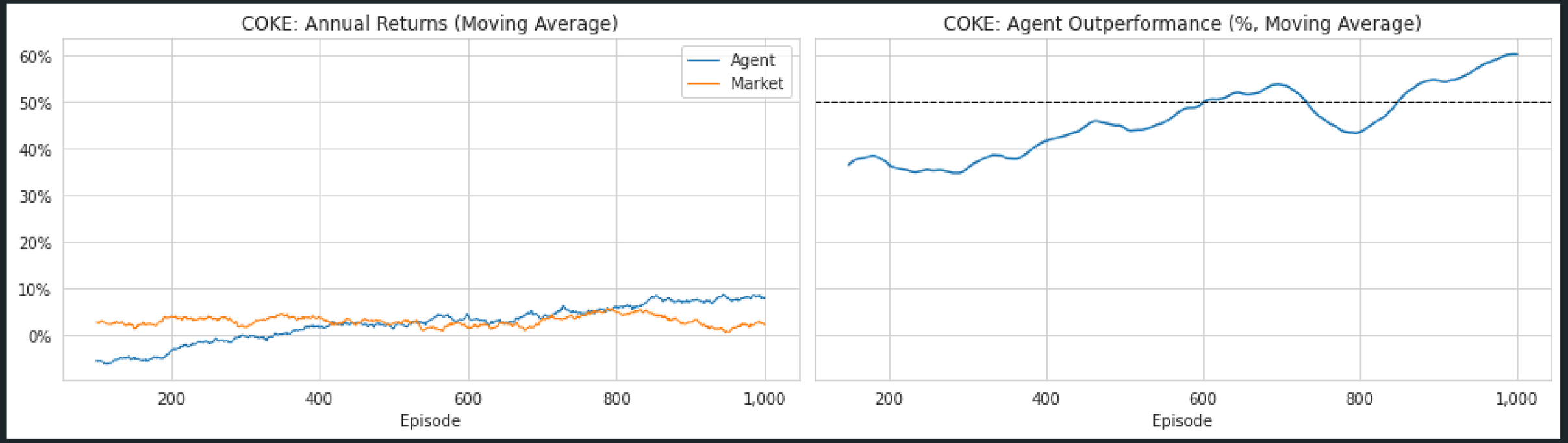
EPSILON GREEDY VS. MARKET

Epsilon Greedy policy greatly outperforms no policy. However, given our limited training episodes, we are performing similar to market performence.



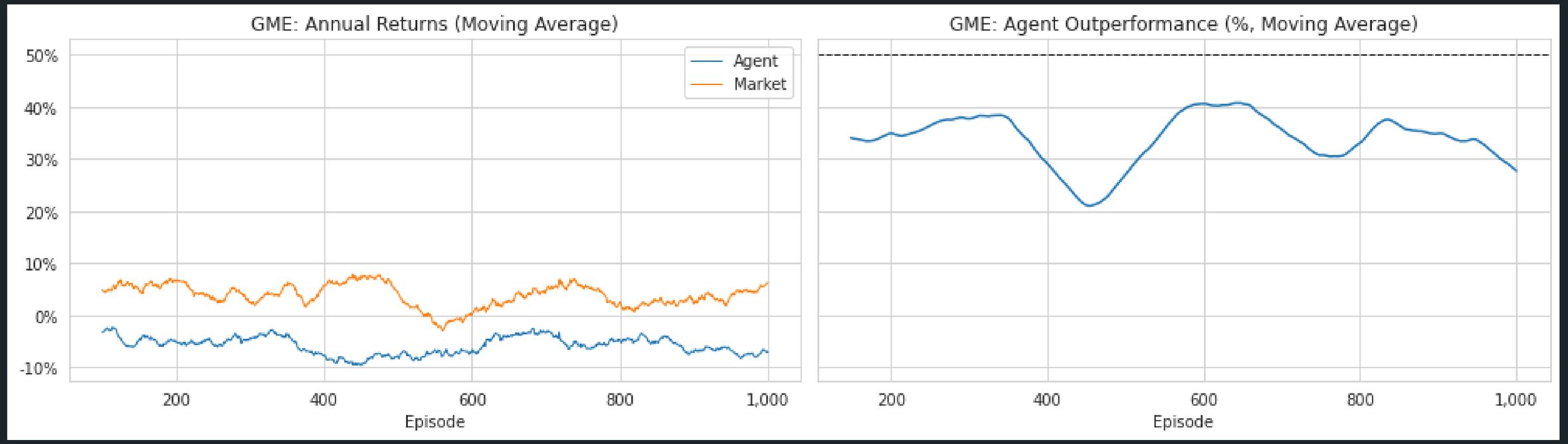
COCA COLA

Without any policy



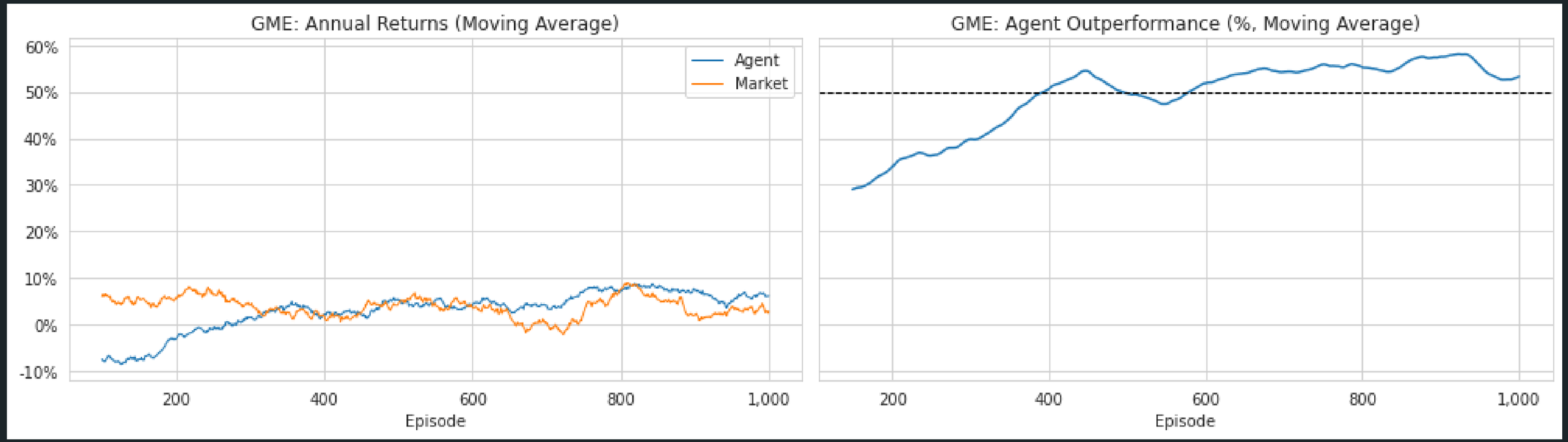
COCA COLA

with Epsilon-Greedy Policy



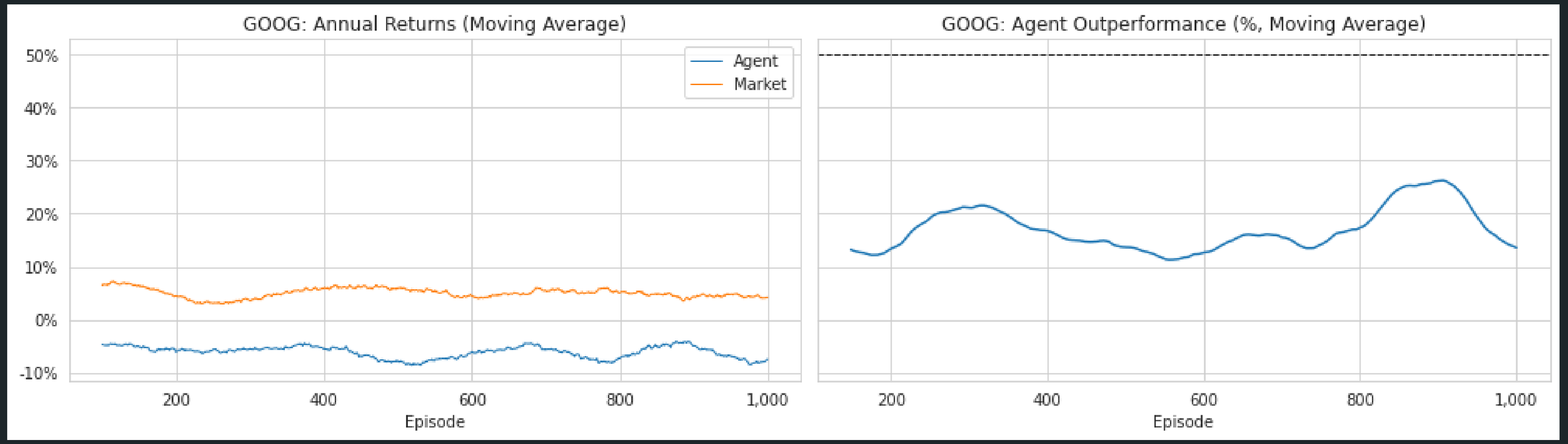
GAME STOP

Without any policy



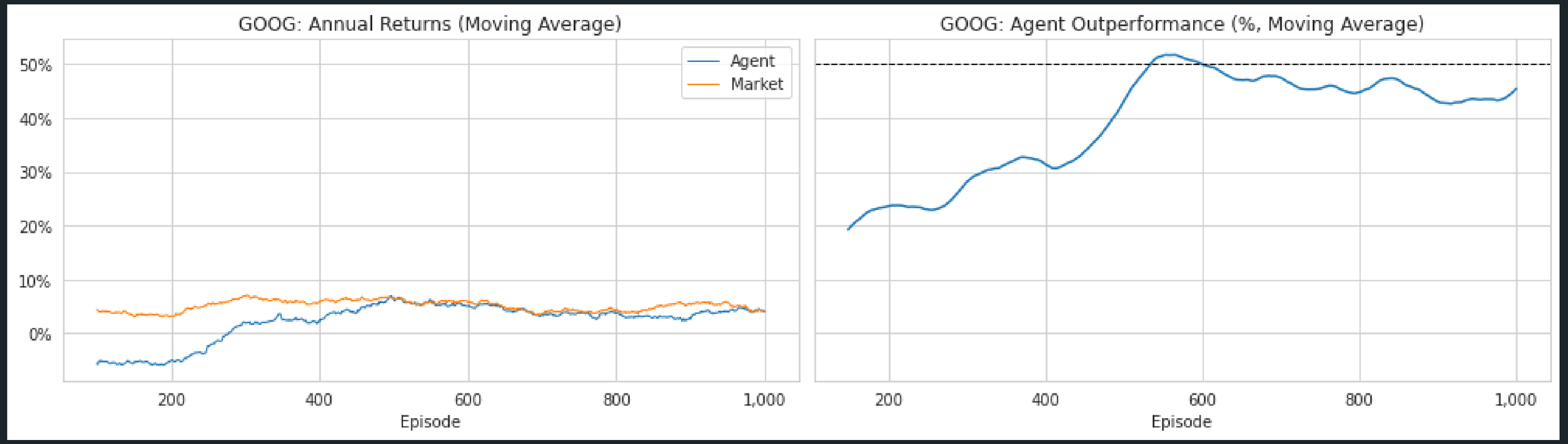
GAME STOP

with Epsilon-Greedy Policy



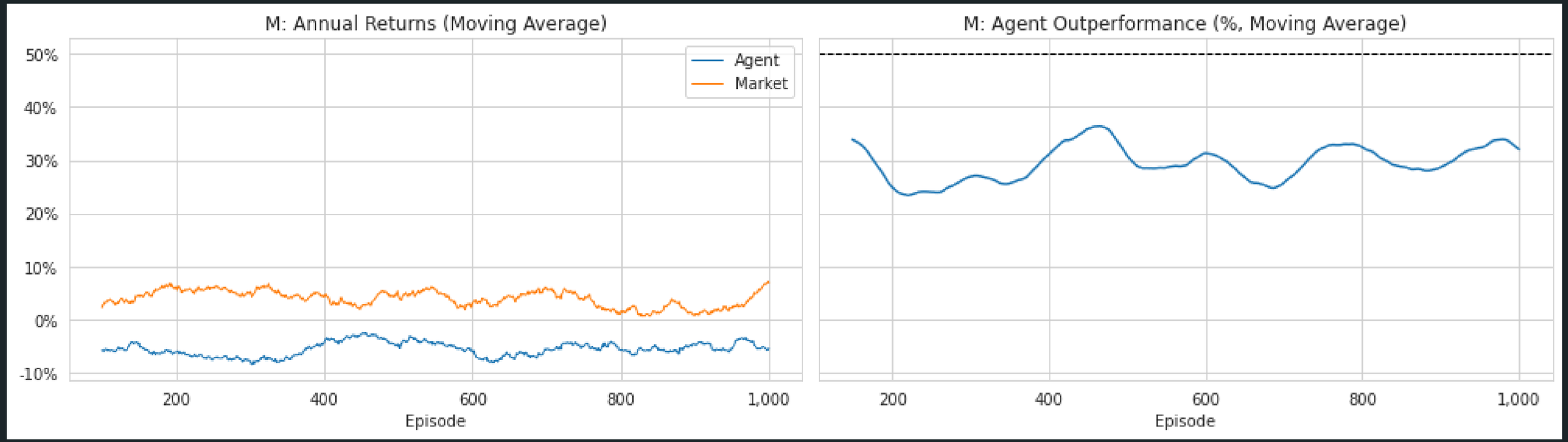
GOOGLE

Without any policy



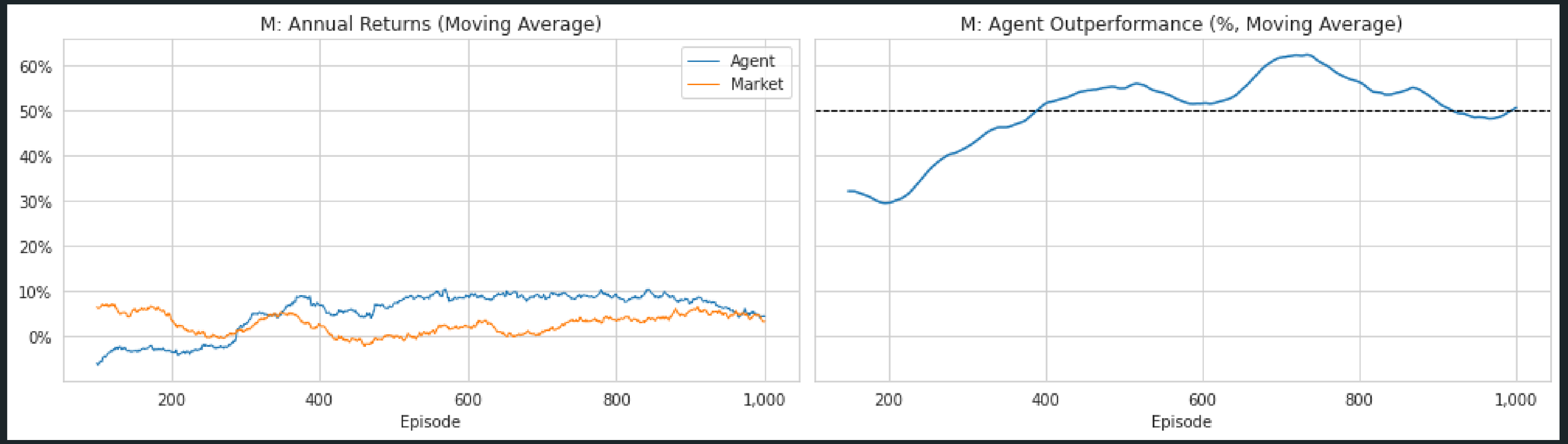
GOOGLE

with Epsilon-Greedy Policy



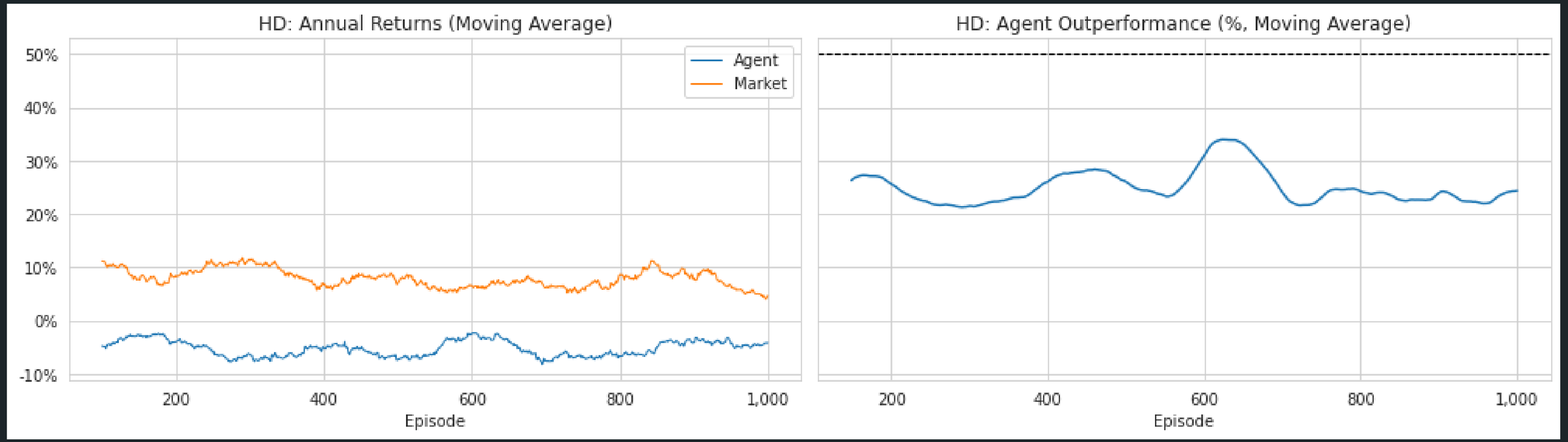
MACY'S

Without any policy



MACY'S

with Epsilon-Greedy Policy

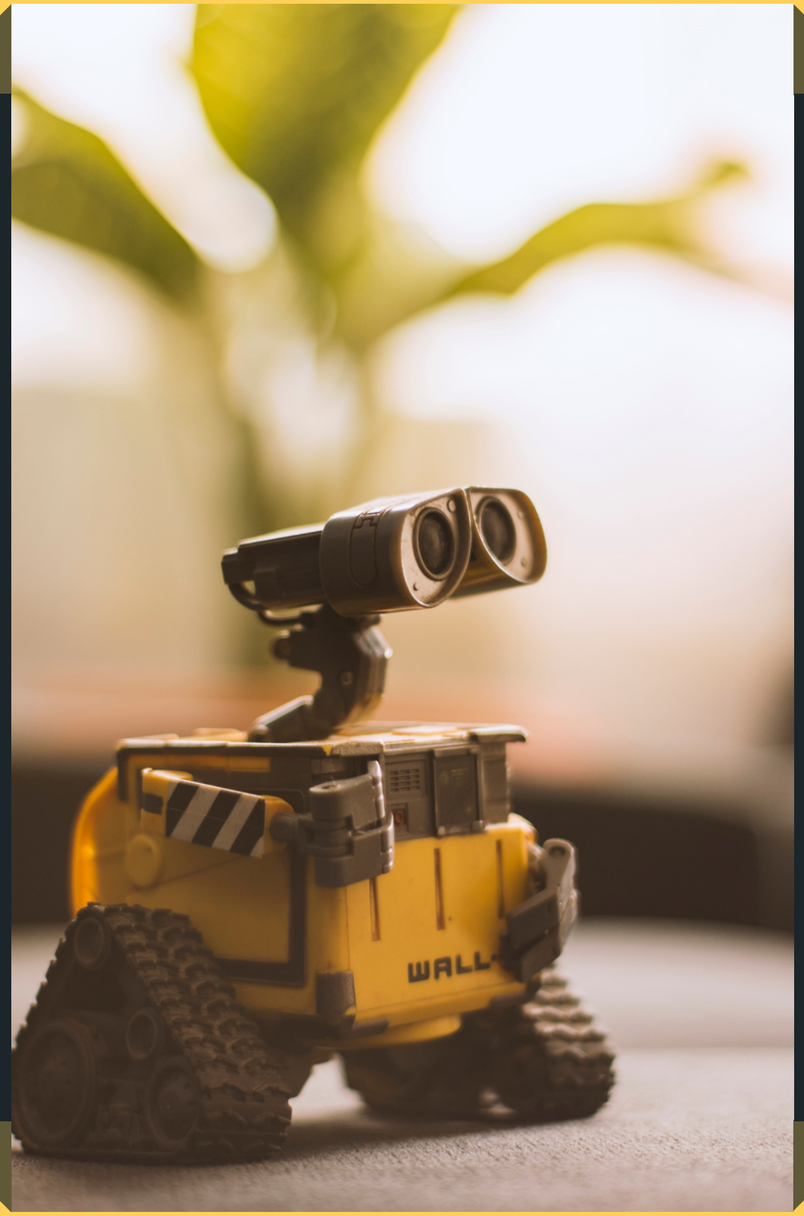


HOME DEPOT

Without any policy

HOME DEPOT

with Epsilon-Greedy Policy

TECHNICAL WALKTHROUGH

LINK TO COLAB