Exploration of Satisficing Behaviors in Economy

Business Processes

Problem

Economic analysis and systems modeling together are not used very often in economics. As a result, there is a gap in economic analysis and simulation.

Economics is composed of numerous theories, but in this case only three were identified.

The first states that expectations are based on history.

to make better decisions.

Solution

The solution was to develop an agent-based model of economic and financial cycles using the three previously mentioned theories.

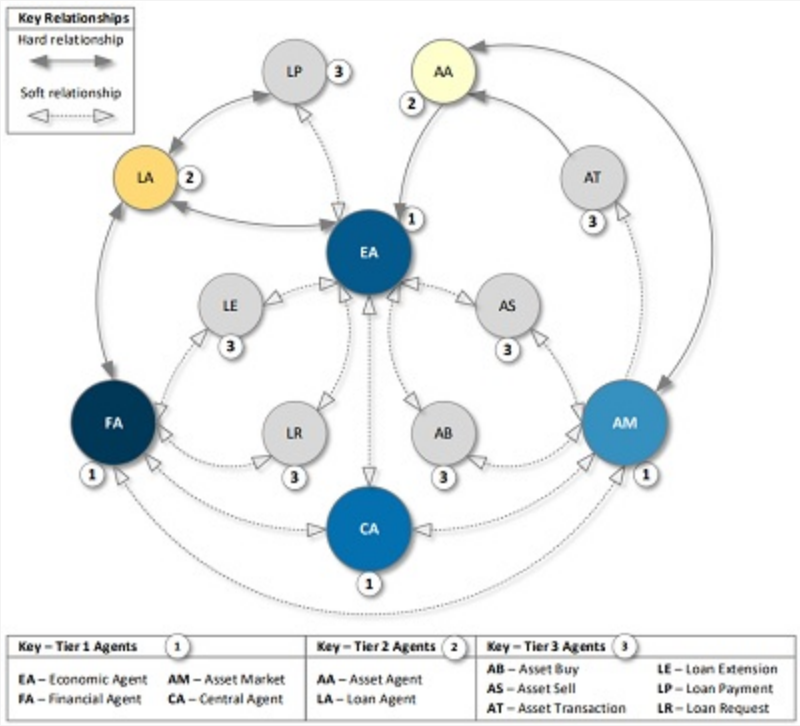
This could be done by developing a behavioral agent-based model to better understand the role of decision making under uncertainty in a complex financial system. Then, simulating multiple financial system outcomes by varying the range of conditions and seeing tangible changes in economic settings.

AnyLogic was chosen as the right tool for the researcher because it could visualize outcomes of a system and behaviors, connect to data sources, or create and manage data, deal with highly complex agents with decision capabilities, and so on.

The design and the theory needed to be connected to build the model. The simulation could not cover all aspects and so limitations or environment considerations were built into the design. These included:

- Internal and external system activity, data, and randomness – behavioral agents determined their own destiny and there was no “real world” data.
- Time and history.
- Financial relationships.
- Financial leakages in the model – not a closed loop system, so all aspects of the model could be tested.
- Agent population and lifecycle – a fixed population

Each agent in the model had different attributes and was assigned to different tiers as shown in the diagram below.

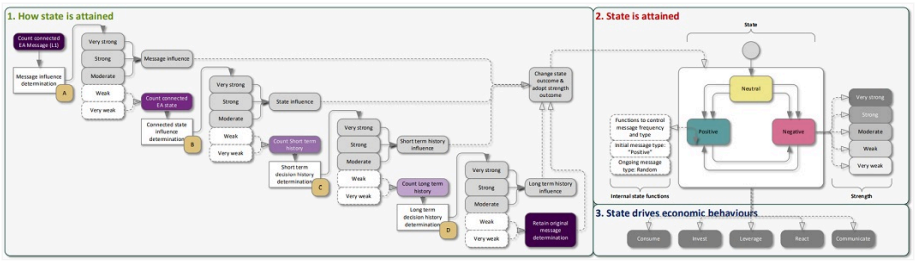


Input data for the simulation (click to enlarge)

- Tier 1 are the behavioral agents in the simulation and the primary drivers of the system.
- Tier 2 agents are non-behavioral agents used as a store of value.
- Tier 3 agents are transactional and can be created and destroyed.

The **Economic Agent (EA)** was the center of the model. It came from the decision-making process and

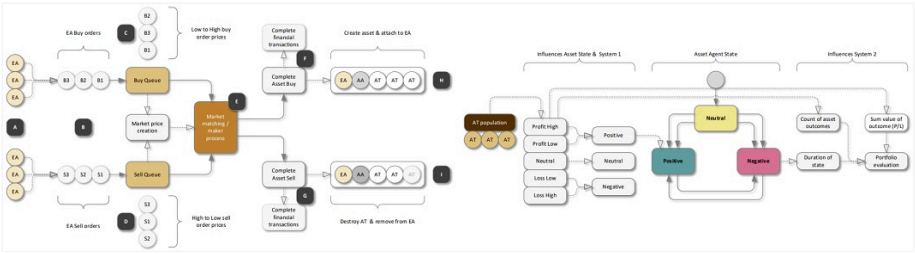
example. The EA would also use historic information to evaluate decisions in the future using its reasoning ability.



How state is determined in the economic agent (click to enlarge)

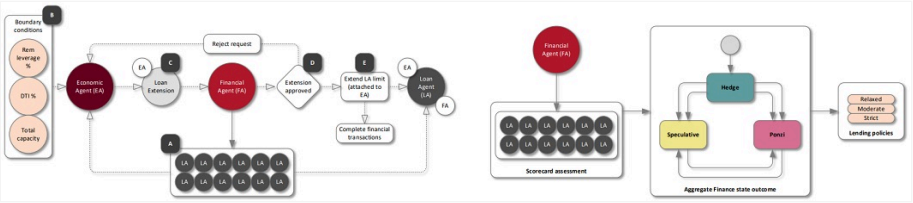
The **Asset Market (AM)** received a buy or sell order from the EA and so acted as a clearing house to ensure that the system continued to operate.

The **Asset Agent (AA)** acted as a portfolio and continuously updated throughout the cycling, holding the three key states of positive, negative, or neutral.



Overview of asset market and asset agent (click to enlarge)

important factors as interest rates, credit defaults, and so on.



Overview of financial agent and loan agent (click to enlarge)

The **controlling Central Agent (CA)** facilitated a number of macroeconomic functions, which included production, employment, and more. This CA sent messages with this information to the other agents in the system.

The Asset Market and CA were designed to shape emotions. Thus, they sent signals irrespective of the actual situation in order to start shaping the agent population and determine how they were going to behave.

The simulation performed by the researcher focused on 26 individual conditions and within these, there were a total of 78 options and so a huge range of behaviors were covered. As a result, the permutations were extensive.

Five themes were covered in the research:

- Population participation.
- Perfect information.
- Strong policy.

strategies and behaviors in a complex financial economy. These included:

- “Rational expectations” is not a viable economic method.
- There is a policy influence, and the stricter the policy, the more stable the market.
- Liquidity drove the market, and more liquidity resulted in more volatility.
- System crashes were averted by cash being generated in the past.
- Human behaviors and psychological reactions drive the market more than fundamentals.

The case study was presented by Dr. Dennis Feher, Sydney University, at the AnyLogic 2021 Conference.

The slides are available as a PDF.

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