# AGGREATE BUSINESS BEHAVIOR UNDER UNCERTAINTY, ENDOGENOUS SENTIMENTS, AND MACROECONOMIC FLUCTUATIONS

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In 1921, both Frank Knight in his *Risk, Uncertainty, and Profit* and Keynes in his *A Treatise on Probability* distinguished the concepts of risk and uncertainty. According to Knight, this distinction is essential because uncertainty brings profit opportunities that would not exist in situations to which probability distributions can be assigned (Rakow, 2010). Keynes (1936) argues that it is not possible to represent future outcomes with a probability distribution because an exhaustive list of possible outcomes cannot be known (Dimand, 2021).

In the presence of uncertainty, sentiments play an important role in decisions of economic agents. Because of the unknowability of the future, Keynes (1936) suggests that rational calculation can only in part justify the decisions and actions of economic agents (Marchionatti, 1999). Instead of objective calculations and optimization, economic agents form their expectations with extrapolation, and then, they complement them with what he calls animal spirits (Geiger, 2016).

As firms operate in a complex environment, uncertainty is present in all stages of the production process. Minsky and Kaufman (2008) argue that investors arrange their asset and liability structures to protect themselves against unfavorable events. Indeed, firms use buffering mechanisms to absorb the effects of uncertainties that might disrupt the production process. These buffers might take different forms towards the type of uncertainty they are built against. Firms hold capacity buffers against uncertainties such as machine breakdowns, discontinuities in capacity adjustment, or variability in the amount and composition of demand (Caputo, 1996). Firms hold raw material, semi-finished goods, and finished goods in inventories proportional to their sales (Tinbergen and Polak, 1950). Firms also hold liquid assets as a buffer stock against unexpected declines in cash flow, particularly when they have fixed commitments such as loan payments (Baum et al., 2005). Apart from buffers on the asset side, firms hold retained earnings on the liability side to keep the company floating and make regular dividend payments in case of unexpected declines in profits (Cyert et al., 1996).

This study aims to investigate the interactions between the real sector sentiment and aggregate income through aggregate business decisions on buffer stocks they hold against uncertainty. A system dynamics model will be built, in which the level of excess capital stock, excess inventories, excess liquid assets, and retained assets held by business firms will be a function of the sentiment index. Sentiment index will also be endogenized, which will be assumed to be a function of the growth rate and volatility of the aggregate demand of the firms. As the unit cost of firms will be assumed to be fixed, firm profits would change in the same direction with the aggregate demand.

**Level of Aggregation:** The project is aimed for academic audience. The level of aggregation is determined by the Stock-Flow-Consistent (SFC) framework pioneered by Godley and Lavoie (2006). In SFC framework, each agent in an economy is represented with a balance sheet. Fund and good flows between agents are recorded in accordance with accounting principles.

There will be three groups of agents in the model: households, firms, and banks. In order to focus on the dynamics resulting from firm behavior, the behaviors of households and banks will be simplified.

**Sources of Inertia:** Firm capital stock, firm inventories, firm liabilities, firm cash stock, and real sector sentiment.

**Reference Mode:** Both the aggregate income and real sector sentiments are expected to exhibit oscillations for a reasonable set of parameter values. Furthermore, the sensitivity parameters of the real sector sentiment index are expected to have major impacts on the dynamic behaviors of these two variables.

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