

# FIRM BEHAVIOR UNDER UNCERTAINTY, ENDOGENOUS SENTIMENTS, AND MACROECONOMIC FLUCTUATIONS

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Personel Problem Draft

In 1921, both Frank Knight in *Risk, Uncertainty, and Profit* and Keynes in *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 where 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 the decisions of economic agents. Due to the unknowability of the future, Keynes (1936) suggests that rational calculation can only partially justify the decisions and actions of economic agents (Marchionatti, 1999). Instead of objective calculations and optimization, economic agents form their expectations by extrapolation and then complement them with what he calls "animal spirits" (Geiger, 2016).

As firms operate in a complex environment, uncertainty is present at 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 may take different forms depending on the type of uncertainty they are designed to address. 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 also maintain inventories of raw materials, semi-finished goods, and finished goods proportional to their sales (Tinbergen and Polak, 1950). Additionally, firms 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 afloat and ensure regular dividend payments in case of unexpected declines in profits (Cyert et al., 1996).

This study aims to investigate the interactions between real-sector sentiment and aggregate demand through firms' decisions on the buffer stocks they hold against uncertainty. In the model, there will be three groups of agents: households, firms, and banks. In order to focus on the dynamics resulting from firm behavior, the behaviors of households and banks will be simplified.

Households have a wealth target, which is a certain multiple of their standard of living. To reach this target over a specified period, they save part of their income and spend the rest on consumption. The only asset is bank deposits, and the only good consumed is produced by firms in the economy. We assume there is a minimum level of consumption, referred to as "necessities."

If households' remaining income after savings falls below this amount, they demand loans from banks.

On the other hand, banks extend loans demanded by households and firms and issue bank deposits. Bank loans are assumed to be amortized, with a certain fraction paid over a specified time period, with interest charged on the remaining principal. Banks also pay interest on bank deposits and distribute all their profits to households. Interest rates are assumed to be fixed.

Firms produce a homogeneous nondurable final good using capital and labor as the only inputs, combined in fixed proportions according to a Leontief-type production function. The price of the product and the wage rate are assumed to be fixed. Since the unit cost of firms is constant due to the assumption about the production function, firm profits move in parallel with aggregate demand. Firms distribute some part of their profits to households. Firms hold cash in the form of bank deposits to make payments. They also take out loans as liabilities, which they use to finance their entire capital stock. Firms hold excess capital stock, excess product inventories, excess liquid assets, and retained profits as buffers against uncertainties in the production process. The level of these buffer stocks is a function of the sentiment index. In turn, the sentiment index is endogenous -assumed to be a positive function of the growth rate and a negative function of the volatility of aggregate demand that firms encounter.

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

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

**Reference Mode:** Both aggregate income and real-sector sentiment 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 significant impacts on the dynamic behaviors of these two variables.

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