A main drawback of the perfect competition model is that it ignores the firm size distribution in a long run equilibrium. Specifically it says any number of firms an size distribution is possible. Empirical evidence suggests otherwise, as values of $C_4$ are similar in a variety of countries of similar size for each industry. However, the opposite is true for countries of different sizes. This suggests that market size is an important determinant of market structure. So we’ll consider a simple model that explains how the number of firms changes with market size.
We’ll first look at a model where all firms are the same size. This way calculating concentration is the same as calculating the number of firms. For example, \( C_m = \frac{m}{n} \) where \( n \) is the number of firms. So changes in this measure of concentration can be measured by changes in \( n \).

Next assume that each firm has a cost function given by

\[
C = F + cq_i
\]

and the demand curve is given by

\[
Q = (a - P)S
\]
where $S$ measures market size.

- Note increasing $S$ by a factor increases $Q$ by the same factor.

- We can show that, in equilibrium, each firm's profits is given by

$$\Pi(n) = S \left( \frac{a - c}{n + 1} \right)^2 - F$$

- A free entry equilibrium is characterized by a set of firms such that no incumbent firm wishes to leave the market and no outside firm wishes to enter the market.

- Specifically, the equilibrium number of firms $\hat{n}$ has to be such that:
\[ \Pi(\hat{n}) \geq 0, \quad \Pi(\hat{n} + 1) \leq 0. \]

Solving, by equating the profit function to 0, an “integerizing” we get

\[ \hat{n} = \left[ (a - c) \sqrt{\frac{S}{F}} - 1 \right] \]

This gives a relationship between market size and concentration.

The number of firms is an increasing function of market size (measured by \( S \)) and a decreasing function of fixed and variable costs.

However, the relationship between market size and concentration is not proportional.

Specifically, the relation between \( S \) and \( \hat{n} \) is quadratic.
To double the number of firms market size must quadruple.

This can be easily explained- if market price did not vary with the number of firms, the relationship between $S$ and $\hat{n}$ would be proportional.

But as the number of firms increases, the market becomes more competitive, meaning margins decrease.

This means variable profit per unit of $S$ also decreases which limits the number of firms that the market can sustain.