The PP curve – # of firms and price

The more firms, the greater the competition, the lower the price they have to charge. In the model, firms take each other price (the price of the competition \( \bar{P} \)) as given.

so the demand
\[
Q = S \times \left(\frac{1}{n} - b(P - \bar{P})\right)
\]
can be rewritten
\[
Q = \left(\frac{S}{n}\right) + Sb \bar{P} - SbP
\]
if we set
\[
\left(\frac{S}{n}\right) + Sb \bar{P} = A \quad \text{and} \quad Sb = B
\]
we get
\[
Q = A - BP
\]
a normal form for a demand curve
as
\[
MR = P - \left(\frac{Q}{B}\right) \quad \text{(see appendix)}
\]
replacing B by Sb yields
\[
MR = P - \left(\frac{Q}{Sb}\right)
\]
The profit maximizing firm will set \( MR = MC (=c, \text{the variable costs}) \) to maximize profit
i.e.
\[
P - \left(\frac{Q}{Sb}\right) = c
\]
or
\[
P = \left(\frac{Q}{Sb}\right) + c
\]
as \( Q = S/n \) in equilibrium
\[
P = \left(\frac{1}{bn}\right) + c
\]
this is (as expected) an inverse relation between price and the number of firms:

Appendix: Derivation of the marginal revenue MR

<table>
<thead>
<tr>
<th>Demand</th>
<th>Q = A – BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>so</td>
<td>P = A/B – Q/B</td>
</tr>
<tr>
<td>Total revenues</td>
<td>PQ = AQ/B – Q^2/B</td>
</tr>
<tr>
<td>Marginal revenue</td>
<td>MR = A/B – 2Q/B</td>
</tr>
<tr>
<td>Since</td>
<td>A/B – Q/B = P</td>
</tr>
<tr>
<td>We have</td>
<td>MR = P – Q/B</td>
</tr>
</tbody>
</table>