# Linear Market Model

Supply

Consider a linear supply function:

qs = a + bp;

qs = quantity supplied by the market

p = market price

a = quantity supplied at a zero price (y intercept of the supply function)

b = the change in units supplied in response to a price change (slope of supply function)

Markets are usually represented visually with price on the vertical axis. The inverse supply function makes price as the dependent variable. The aforementioned supply function solved for p gives:

p = (- a + qs) / b

Demand

The linear demand function is:

qd = c + dp

qd = quantity demanded in the market

p = market price

a = quantity demanded at a zero price (y intercept of the demand function)

b = the change in units demanded in response to a price change (slope of demand function)

The inverse is:

p = (- c + qd) / d

Equilibrium

In equilibrium, quantity supplied equals quantity demanded so there qs=qd, and the inverse functions being equal means:

- a/b + qs/b = - c/d + qd/d

Solving algebraically,

* -a + q = -bc/d + bq/d
* -ad + dq = -bc + bq
* ad - bq + dq = -bc
* -bq + dq = ad - bc
* q(-b + d) = ad - bc
* q = (ad−bc) / (-b+d)

q=(ad−bc)/(-b+d)