Demand

According to Alfred Marshall, demand schedule shows the amounts of a good that consumers are willing to purchase at various prices. Later, the term “demand schedule” was changed to “demand curve.” It is not a single number. It depends on many variables. However, we focus on relevant economic variables such as income and prices, ignoring the impacts of other noneconomic variables.

A consumer’s demand function for good 1 may be written as $x_i(p_1, p_2, ..., p_n, I)$, where $p_i$ is the price of good $i$, and $I$ is income. However, among the economic variables, the most important variable is its own price, $p_i$. Thus, it is important to observe how a consumer’s demand for a good responds to a change in the price of the good itself, ignoring all other variables. In this case, one can show the relationship between the price of a good and the quantity demanded by the consumer.
Market demand is simply a horizontal summation of individual demand curves.
For instance, in Figure 2, ab (the quantity demanded by Adam) + ac (the quantity demanded by Bob) = ad (aggregate demand), or ab = cd.

If individual demand curves are straight lines, do they yield a straight-line aggregate demand curve?
Remark: The aggregate demand curves with many consumers with different tastes will NOT yield straight line demand curves even if individual demand curves are. However, for simplicity, we often assume that aggregate demand curves have the same properties as individual ones.

Example:

Demand Functions.

(1) Express the maximum price consumers are willing to pay for given outputs.
(2) Express the quantity consumers want to buy for given prices.

Aggregate Demand curve for a private consumption good: Add quantities

Add two demand curves for a private consumption good.

\[ p = a - b_1 X_1, \quad (1) \]
\[ p = a - b_2 X_2. \quad (2) \]

First, derive the demand function, i.e., quantity demanded in terms of price
\[ X_1 = \frac{a - p}{b_1}, \quad (3) \]
\[ X_2 = \frac{a - p}{b_2}, \quad (4) \]

The sum is:
\[ X = a \left( \frac{1}{b_1} + \frac{1}{b_2} \right) - \left( \frac{1}{b_1} + \frac{1}{b_2} \right) p. \quad (5) \]

For instance, if \( a = 1, b_1 = 1, b_2 = 2, \)
\[ X_1 = 1 - p, \quad (6) \]
\[ X_2 = \frac{1 - p}{2}. \quad (7) \]

And the market demand is
\[ X = \left( 1 + \frac{1}{2} \right) - \left( 1 + \frac{1}{2} \right) p. \quad (8) \]

Also note that adding (6) and (7) yields market demand in (8).

If \( p = 1, \)
\[ X = \frac{3}{2} - \frac{3}{2} = 0, \]
which means the market demand curve has a \textit{vertical} intercept.

If \( p = 0, \) then
\[ X = \frac{3}{2}. \]

This means the market demand curve has a horizontal intercept at \( 3/2. \)
Aggregate Demand for a Public Good

Add prices consumers are willing to pay!

Demand functions need to be modified for a public good, whose quantity cannot be chosen by an individual. The government chooses the quantity of the public good. Thus, for a public good,

\[ X_1 = X_2 = X. \]  

(9)

Also, consumers with different tastes are not willing to pay the same price for the public good. This means that we need to allow different prices consumers are willing to pay for the same quantity of the public good. Thus, demand functions in (1) and (2) are rewritten as:

\[ p_1 = a_1 - b_1 X, \]

(10)

\[ p_2 = a_2 - b_2 X. \]

(11)

Thus, the total amount the public is willing to pay is:

\[ p = p_1 + p_2 = (a_1 + a_2) - (b_1 + b_2) X. \]

(12)

For a public good, aggregate demand or aggregate willingness to pay is a vertical summation of the two individual demand curves. In contrast, aggregate demand for a private consumption good is a horizontal summation of the two individual demand curves.
Supply

A firm’s supply curve shows the relationship between price and the quantity supplied by that firm, as illustrated by $S_1$ in the figure below.

Market Supply Curve = a horizontal summation of individual supply curves.
Supply Curve with an Import Quota

Figure 2.1 in Perloff is based on the assumption that the US is the only importer. For most imported goods, it is more realistic to assume that the US is a competitive importer. If the US imposes an import quota Q and the world price is p*, we obtain a different total supply curve. Just follow the pink dots below.
Market Equilibrium
ME occurs at the intersection of demand and supply curves. In Figure 3, market equilibrium occurs at point $a$.

**Effects of a Sales Tax**

The initial equilibrium occurs at point $a$. Suppose the government imposes a specific tax (which is paid per unit) of $1.00 on wine producers.

This tax causes a vertical shift in the supply curve from $S$ to $S'$. The vertical distance $bc$ is the tax. Although producers appear to pay the specific tax, in effect they pay only a small portion, the difference $(p^o - p^*)$, but consumers effectively bear the lion’s share of the tax $(p' - p^o)$. This occurs when the demand curve is steeper than the supply curve. Producers would bear a higher burden if the demand curve were much flatter. Thus, the slope does affect the relative share of the tax burden.
How much of the tax burden do consumers bear if the supply curve were horizontal?
In this case, regardless of the slope of the demand curve, consumers bear the burden alone.
Pictures: