The kinked demand curve

Consider a firm operating in an oligopolistic market. In deciding whether or not to change its price, it must consider how the other firms in the market might react. Suppose that these rival firms will do one of two things—they will all either match the price change or they will all ignore it. Let $P = f(Q)$ be the firm's demand curve corresponding to the "match-price strategy" of its rivals and $P = g(Q)$ be the demand curve corresponding to an "ignore-price strategy" by its rivals. Both demand curves are downsloping, however $f(Q)$ is steeper than $g(Q)$: $|f'(Q)| > |g'(Q)|$. ($P = f(Q)$ is shown by demand curve "D_1" in your text while $P = g(Q)$ is shown by demand curve "D_2"). The kinked-demand curve model assumes a combined strategy by the rival firms in an oligopoly: rivals will match a price decrease but ignore a price increase. If all firms follow such a strategy, then the demand curve facing each firm will have a "kink" in it at the going price. That is, demand is given by $P = f(Q)$ for prices below the going price, by $P = g(Q)$ for prices above the going price.

Suppose the firm wishes to consider increasing output, forcing a price decrease along the corresponding demand curve, $P = f(Q)$. Revenue along this demand curve is $R(Q) = Qf(Q)$ and marginal revenue is $R'(Q) = f(Q) + Qf'(Q) = P(1 - 1/E_1)$ where E_1 is the elasticity of demand on the demand curve $P = f(Q)$ at the current output. (This correspondence between marginal revenue and the elasticity of demand was illustrated in math note 10.2, "Elastic demand at the monopoly price,") However, the firm's revenue after a price *increase* follows demand curve g(Q). That is, its revenue is $R(Q) = Qg(Q)$ and marginal revenue is $R'(Q) = g(Q) + Qg'(Q) = P(1 - 1/E_2)$ where E_2 is the elasticity of demand on the demand curve $P = g(Q)$ at the current output.

Recall that elasticity of demand is $\left|\frac{dQ}{dP} \times \frac{P}{Q}\right|$, where dQ/dP is the inverse of the slope of the demand curve as usually drawn. As written here, then, $E_1 = \left|\frac{1}{f'(Q)} \times \frac{P}{Q}\right|$ and $E_2 = \left|\frac{1}{g'(Q)} \times \frac{P}{Q}\right|$. Since $|f'(Q)| > |g'(Q)|$ by assumption, $E_1 < E_2$. Substituting these relationships into the corresponding relationships for marginal revenue and evaluating at the going price, it is clear that $MR_1 = P(1 - 1/E_1)$ must be less than $P(1 - 1/E_2) = MR_2$. That is, the firm's marginal revenue for a price decrease is less than the marginal revenue for a price increase; the marginal revenue function must have a "gap" at the going price and quantity.