Other-things-equal assumption

In mathematics, the "other-things-equal assumption" is embodied in the concept of the partial derivative. Suppose, for example, that the amount of Pepsi consumed (Q_P) depends on its price (P_P), the price of Coca-Cola (P_C), consumer incomes (I), and preferences (Z) according to the relationship $Q_P = f(P_P, P_C, I, Z)$. If we wish to investigate the effect of a change in the amount of Pepsi brought about by a change in its price, *other things equal*, we would compute $\partial Q_P / \partial P_C$, the partial derivative of the quantity with respect to its price.

Consider the following example from Rao and Miller. They estimate the demand for Ceylonese Tea to be $Q_C = 1.85 – 2.10P_C + 0.20P_B + 1.56P_I$, where Q_C is the quantity of Ceylonese tea demanded, P_C is its price, and P_B and P_I are the prices of Brazilian coffee and Indian tea, respectively (all variables are expressed in logarithms.) If we wish to know what happens to the quantity of Ceylonese tea demanded when its price changes, with no change in the prices of Brazilian coffee or Indian tea, we can simply calculate $\partial Q_P / \partial P_C = – 2.10$. This tells us that each unit increase in the (logarithm of the) price of Ceylonese tea reduces its (logarithm of) consumption by 2.10, all else constant. Likewise, each increase in the price of Brazilian coffee is found to increase the quantity of Ceylonese tea, all else constant, by $\partial Q_P / \partial P_C = 0.20$.