

What Do Gradients Mean?

Calibrated intercepts have specific economic meanings in EDMP models. Solution gradients are the implicit changes in the value of the objective function for a one-unit increase in the activity at equilibrium. For demand activities in perfect competition, the intercepts are the prices satisfying *a priori* targets for that activity's base period prices, quantities, and elasticity of demand. Hence, for demand activities, the gradients are the perfectly competitive equilibrium market prices of the commodities, as shown in figure 1. However, if the activity is monopolistic or monopsonistic, the gradients are intercepts of marginal revenue or marginal factor cost functions satisfying the same *a priori* targets, as shown in figure 2. Note that gradients are **not** prices for monopolistic or monopsonistic activities. They are the intersections of marginal revenues and/or marginal factor costs for these activities. For activities exhibiting monopoly power, prices and quantities are on the demand curve, but not on the supply curve. For monopsony power situations, the opposite is true. Market prices for monopolistic/monopsonistic demand and factor supply activities must be post-optimally calculated with respect to the original demand functions and factor supply functions, that is, the calibrated intercept *minus* respective Hessian element *times* the respective activity level.

Production activities are the crop, intermediate product, and livestock production activities that use factors supplied in factor acquisition activities and produce products sold or products used in further processing activities within the model. In perfect competition, the gradients of production activities are the negative of the gross margin of that activity above the costs specified in the model.