# How Can a Statistical Agency Predict Tightness?

Pascal Michaillat
https://www.pascalmichaillat.org/t5.html

Statistical agency announces a tightness $x^s$

Households take $x^s$ as given

$\rightarrow$ Household $i$ will buy $y^i(x^s) = \sigma(x^s)\left[f(x^s)k_i + \frac{\mu_i}{\rho}\right]$

$\rightarrow$ Household $i$ will visit $v^i(x^s) = \frac{y^i(x^s)}{q(x^s)}$

$\rightarrow$ Realized tightness will be:

$$x = \frac{\sum_i v_i(x^s)}{\sum_i k_i} = \frac{\sum_i y_i(x^s)}{q(x^s)\cdot \bar{k}}$$

$$x = \frac{\sigma(x^s)\left(f(x^s)\,k + \mu/\rho\right)}{q(x^s)\quad k}$$

$$\frac{x}{x^s} = \frac{\overbrace{\sigma(x^s)\left[\overbrace{f(x^s)\,k + \mu/\rho}^{y^s(x^s)}\right]}^{}}{\underbrace{x^s\, q(x^s)}_{f(x^s)}\cdot k}$$

$y^s(x^s)$

must be 1

Statistical agency aims to make a correct forecast:

They aim to announce $x^s$ such $\boxed{x^s = x}$

They announce $x^s$ such that

$$y^s(x^s) = \sigma(x^s)\left[y^s(x^s) + \mu/p\right]$$

$$[1-\sigma(x^s)]\, y^s(x^s) = \sigma(x^s)\,(\mu/p)$$

$$y^s(x^s) = \underbrace{\frac{\sigma(x^s)}{1-\sigma(x^s)}\,\frac{\mu}{p}}_{y^d(x^s)}$$

Statistical agency announces $x^s$ such that:

$$\boxed{y^s(x^s) = y^d(x^s)}$$

Since $x$ (realized) $= x^s$ (forecast)

then

$$\boxed{y^s(x) = y^d(x)}$$