Code documentation

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1 GMM standard errors

I minimize the quadratic form:

$$Q = \psi(w, \mu)' A \psi(w, \mu) \tag{1}$$

The GMM estimates have a distribution of:

$$\sqrt{N}(\hat{\mu} - \mu) \to N(0, \tilde{V})$$

where $A = (D'AD)^{-1}D'AVAD(D'AD)^{-1}$. Here:

- D is the model gradient.
- V is defined as:

$$V = \lim_{N \to \infty} \frac{1}{N} \sum_{i=1}^{N} \mathbb{E}\left(\psi(w_i, \mu)\psi(w_i, \mu)'\right)$$

1.1 Estimating the variance matrix

I will now describe how do I estimate each component of the variance covariance matrix A:

- **Estimating V:** our estimate is:

$$\hat{V} = \frac{1}{N} \sum_{i=1}^{N} \mathbb{E}\left(\psi(w_i, \hat{\mu})\psi(w_i, \hat{\mu})'\right)$$

  we compute this estimate this component in the function `estimate_v`

- **Estimating W:** our weighting matrix is simple $(Z'Z)^{-1}$.
- **Estimating D:** this is the gradient of the model's errors. We compute this matrix in the function `estimate_d`.

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A Notation and definitions

Let K be the number of instruments from our GMM model. The model solves the moment equations:

$$Z\varepsilon(\mu)$$

where Z is a $N \times K$ matrix, and $\varepsilon(\mu)$ is a vector of length K.