

Demand Systems Adding Up

TheoryGuru applications

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Load Economicreasoning package only if it is not already loaded

```
If[Length@Names["PLTools`*"] < 10,  
  Get["http://economicreasoning.com"]]
```

Notes

$\nabla u[x], x, p, h_i, s, \epsilon H_i$ are each automatically recognized as vectors with length equal to the number of commodities. That number must not be less than one but is otherwise arbitrary.

In the Wolfram Language, $x.y$ refers to the tensor DOT PRODUCT, NOT scalar multiplication. For TheoryGuru purposes, tensor means vector, so that the result of $x.y$ is a scalar.

Setup

Consumer first-order conditions, as a vector equation

$$\nabla u[x] = \lambda p;$$

$$\text{nonsatiation} = \{\lambda > 0, \text{income} > 0\};$$

Differentiate it with respect to p_i

$$\text{dutility} = \nabla u[x] \cdot h_i = 0;$$

(* h_i is a vector of impacts of p_i on each Hicksian quantity choice *)

Definition of price elasticities

```
defineelas = p.hi == income s.εHi;  
(* εHi is a vector of the (Hicksian) elasticity  
of each quantity demanded with respect to pi *)
```

Result: “Adding up”

```
TheoryGuru[{dutility, defineelas, nonsatiation}, s.εHi == 0]
```

```
True
```

```
TheorySpace[]
```

```
Using MostRecentTheory.
```

```
{income, λ, p.p, p.s, p.hi, p.εHi, s.s, s.hi, s.εHi, hi.hi, hi.εHi, εHi.εHi}  
p, s, hi, εHi are interpreted as vectors.
```

Variable interpretations

Element-by-element notation with 4 goods