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The state-contingent model

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The state-contingent model

- First developed by Arrow and Debreu
- A consistent approach to product differentiation by:
  - quality
  - spatial location
  - time
  - state of nature
- General equilibrium and missing markets

The case for the state-contingent approach

- Analogy between state-contingent production and choice under uncertainty
- Stochastic production functions as a special case
- Consistency with general equilibrium and finance theory
- Structural forms and reduced forms
- Applicability of modern production theory

Production and choice

- Risk premiums and production premiums
- Homotheticity and constant risk aversion
  - Absolute and relative
- Flexibility and risk aversion

Stochastic production functions

- A restrictive special case
- No substitution between states of nature

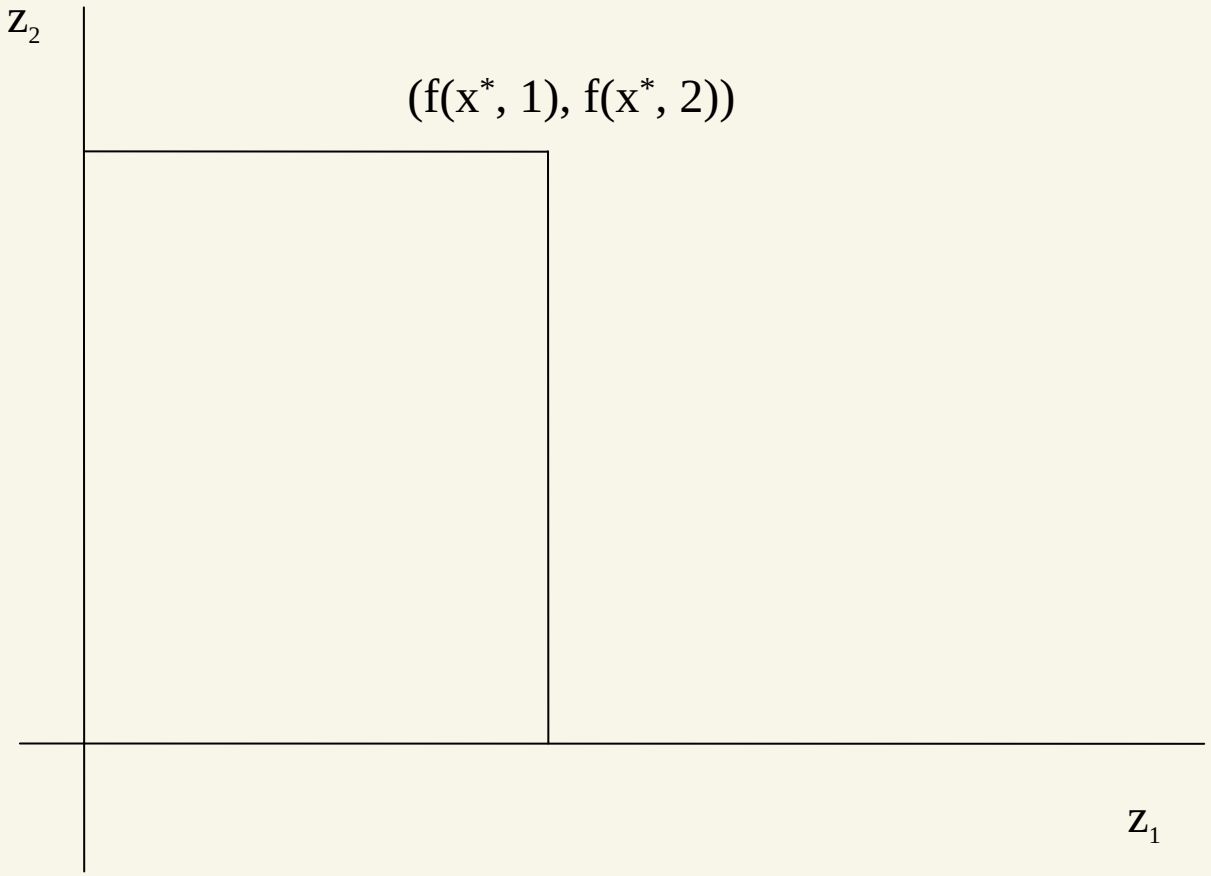

Figure 1: Stochastic production function: S=2

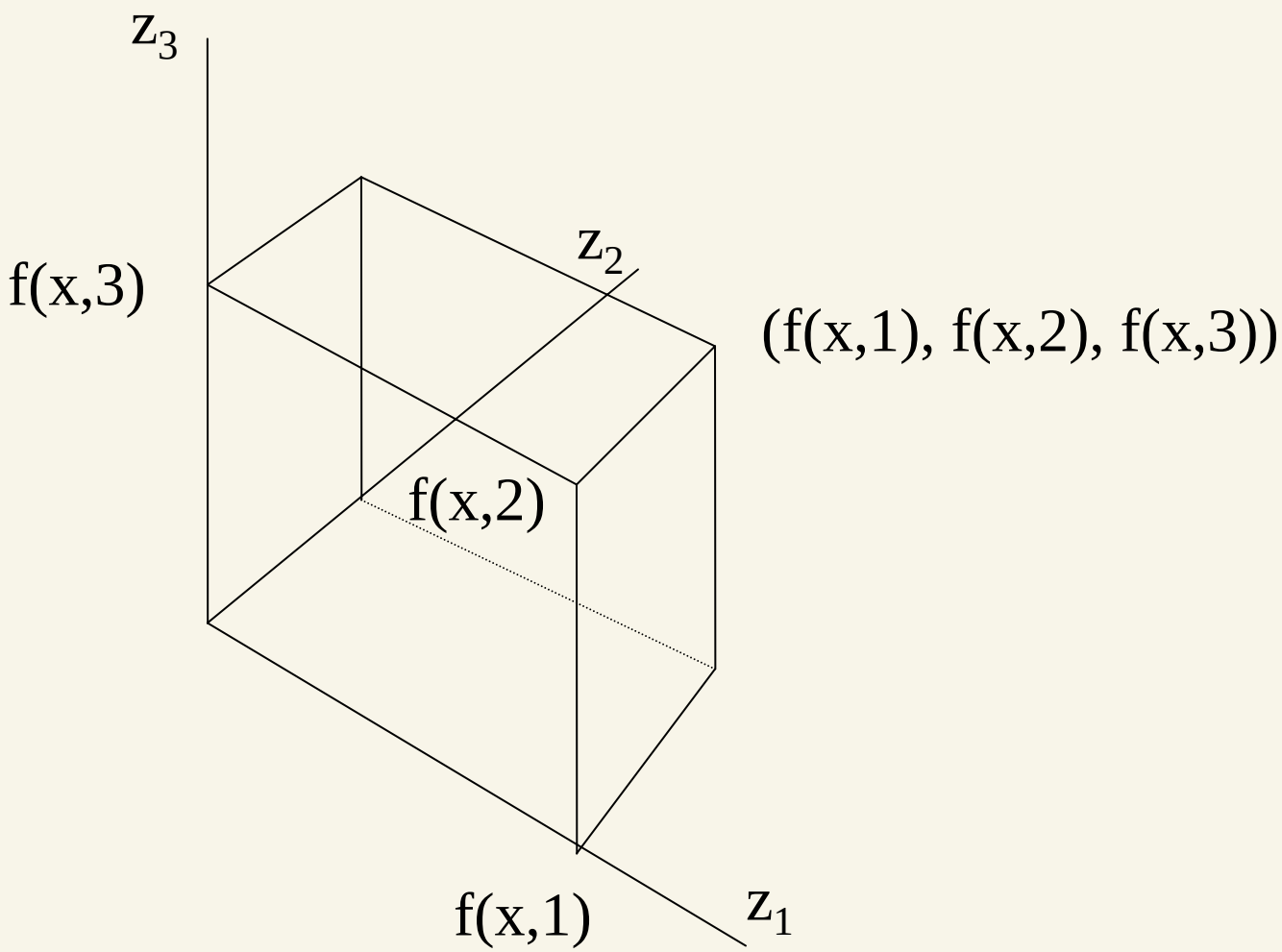

Figure 2: Stochastic production S=2
Output Cubical Output Set

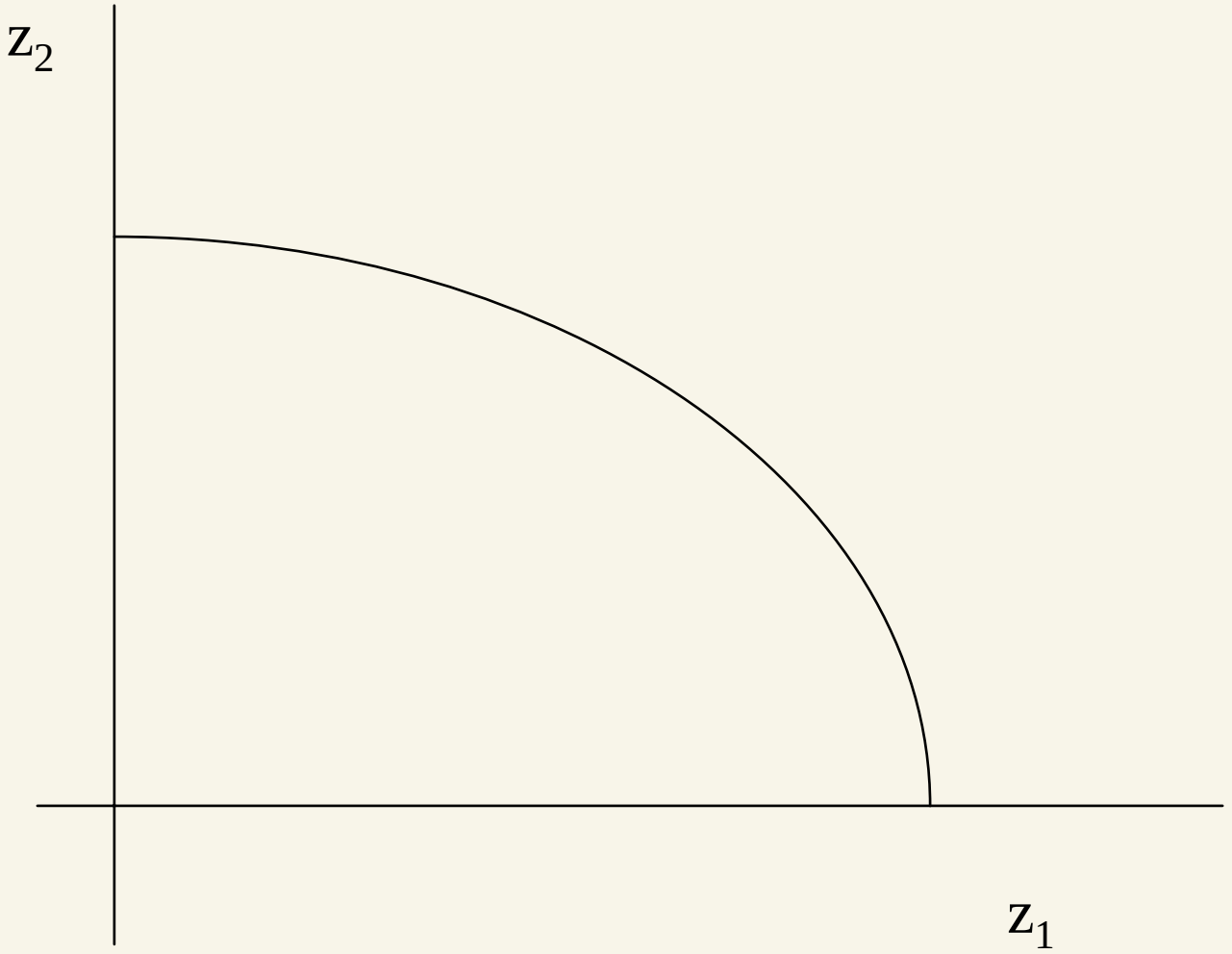

Figure 3: A smooth state-contingent product transformation curve

GE and finance theory

- Original focus of Arrow and Debreu
- Integrating production and finance decisions
- Incorporating moral hazard

Structural forms and reduced forms

- Parametrized distribution function is a reduced form
- State-contingent representation is a structural from

Modern production theory

- Duality
  - Difficult to apply under uncertainty using existing representations
- Convex sets
- Distance and translation functions
- All applicable in state-contingent framework

Policy applications

- Drought policy
- Contract design
- Price stabilisation

Drought policy

- Need to model drought preparation
- Stochastic production function model doesn’t accommodate this
- Risk-reducing and risk-increasing policies

Contract design

- Problem is trivial with SPF technology
  - Output in one state determines output in every other state
  - Principal can get first best by ensuring minimum output
- State-contingent model gives a more realistic analysis

Price stabilisation

- Literature begins with a paradox
  - Waugh- price instability good for consumers
  - Oi - price instability good for producers
- Problem of interpreting supply and demand curves under uncertainty
- State-independent supply curves
  - Generalised Oi result

Empirical applications

- Efficiency estimation
  - Griffiths and O’Donnell
- Stochastic productivity indicators
  - Chambers analyses US aggregate data
- Asset pricing
- Simulation modelling
  - Murray-Darling Basin

The state-contingent approach

- The best way to think about all problems in the economics of uncertainty, including problems of consumer choice, the theory of the firm and principal--agent relationships.