

[Working Papers](#)

# The Learning Curve and Optimal Production Under Uncertainty

---

Saman Majd & Robert S. Pindyck

SHARE



---

WORKING PAPER 2423

DOI 10.3386/w2423

ISSUE DATE October 1987

---

This paper examines the implications of the learning curve in a world of uncertainty. We consider a competitive firm whose costs decline with cumulative output. Because the price of the firm's output evolves stochastically, future production and cumulative output are unknown, and are contingent on future prices and costs. We derive an optimal decision rule that maximizes the firm's market value: produce when price exceeds a critical level, which is a declining function of cumulative output. We show how the shadow value of cumulative production, as well as the total value of the firm, depend on the volatility of price and other parameters. Over the relevant range of prices, uncertainty reduces the shadow value of cumulative production, and therefore increases the critical price required for the firm to begin producing.

Download a PDF

[Information on access](#)


Acknowledgements and Disclosures



Download Citation



## Published Versions

Rand [Journal of Economics](#), vol. 20, no. 3, pp. 331-343, Autumn, 1989. citation courtesy of 

## Related

TOPICS

Econometrics  
Financial Economics

PROGRAMS

Monetary Economics

**More from the NBER**



In addition to [working papers](#), the NBER disseminates affiliates' latest findings through a range of free periodicals — the [NBER Reporter](#), the [NBER Digest](#), the [Bulletin on Health](#), and the [Bulletin on Entrepreneurship](#) — as well as online [conference reports](#), [video lectures](#), and [interviews](#).



Martin Feldstein Lecture, Summer Institute 2025  
**The Fiscal Future**

N. Gregory Mankiw, Harvard University and NBER  
July 10, 2025

**2025, 17th Annual Feldstein Lecture, N. Gregory Mankiw, "The Fiscal Future"**

FELDSTEIN LECTURE

PRESENTER: [N. GREGORY MANKIW](#)

N. Gregory Mankiw, Robert M. Beren Professor of Economics at Harvard University, presented the 2025 Martin Feldstein...



Methods Lecture, Summer Institute 2025  
**Uncovering Causal Mechanisms:  
Mediation Analysis and  
Surrogate Indices**

Raj Chetty, Harvard University and NBER  
Kosuke Imai, Harvard University  
July 24, 2025

**2025, Methods Lecture, Raj Chetty and Kosuke Imai, "Uncovering Causal Mechanisms:  
Mediation Analysis and Surrogate Indices"**

METHODS LECTURES

PRESENTERS: [RAJ CHETTY](#) & [KOSUKE IMAI](#)

SlidesBackground materials on mediationImai, Kosuke, Dustin Tingley, and Teppei Yamamoto. (2013). "Experimental Designs..."



International Trade and Macroeconomics, Summer Institute 2025

**Panel on The Future of the Global Economy**

Oleg Itskhoki, Harvard University and NBER  
Paul Krugman, City University of New York and NBER  
Linda Tesar, University of Michigan and NBER  
July 8, 2025

**2025 International Trade and Macroeconomics, "Panel on The Future of the Global Economy"**

PRESENTERS: [OLEG ITSKHOKI](#), [PAUL R. KRUGMAN](#) & [LINDA TESAR](#)

Supported by the Alfred P. Sloan Foundation grant #G-2023-19633, the Lynde and Harry Bradley Foundation grant #20251294...

## National Bureau of Economic Research

### Contact Us

1050 Massachusetts Avenue  
Cambridge, MA 02138  
617-868-3900  
[info@nber.org](mailto:info@nber.org)  
[webaccessibility@nber.org](mailto:webaccessibility@nber.org)

### HOME PAGE

### Accessibility Policy

### Diversity Policy

### Privacy Policy

### FOLLOW

