

1881

## Edgeworth's *Mathematical Psychics*

Francis Ysidro Edgeworth (1845–1926)

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Francis Ysidro Edgeworth, an Irishman educated at Trinity College, Dublin, and at Oxford, made several important contributions to economics and statistics in the late nineteenth century. In his book *Mathematical Psychics*, published in 1881, Edgeworth, like W. S. Jevons, focused on applying mathematics to the study of utility. He paid particular attention to the exchange of goods, or bartering, between a pair of economic agents. Edgeworth believed that Jevons had oversimplified the exchange process, leading him to conclude wrongly that the same forces that explain price determination in a competitive market setting also apply to bargaining among small numbers of agents.

Edgeworth demonstrated that there is a number of potential bargains that can improve the utility of both agents, just as there is a range of possible sale prices that will make both you and your car dealer better off. Through successive rounds of bargaining, or what Edgeworth called “recontracting,” they eventually exhaust the available gains from exchange. Edgeworth emphasized that there is a variety of potential equilibrium points, lying along what he called the “contract curve.” The particular equilibrium that the agents ultimately reach will depend on how this bargaining plays out. Thus, it isn't possible to determine the relative prices of the bartered goods and the amount each agent consumes outside the context of a competitive market, where prices are determined by forces beyond the individual's control, rather than by bargaining.

Edgeworth's analysis in *Mathematical Psychics* made many groundbreaking contributions, especially by introducing the concept of indifference curves, which show different combinations of goods that provide a consumer with a specific level of utility. British economist Alfred Marshall praised the work, saying that it showed “clear signs of genius,”

and its influence contributed to Edgeworth's appointment as the first editor of *The Economic Journal* in 1891. Subsequent work on the theory of international trade, taxation, and monopoly pricing illustrated Edgeworth's capacity for making important theoretical contributions across the economic spectrum. Nonetheless, some of the most important implications of *Mathematical Psychics* lay dormant for decades, until the development of game theory provided economists with tools to reach more definitive conclusions about the outcomes of bargaining.

**SEE ALSO** [Jevons's \*Theory of Political Economy\* \(1871\)](#), [Economics Journals \(1886\)](#), [Ordinal Utility \(1893\)](#), [Indifference Curves \(1906\)](#), [The Hicks–Allen Consumer Theory \(1934\)](#), [Game Theory Enters Economics \(1944\)](#), [Non-Cooperative Games and Nash Equilibrium \(1950\)](#)

