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Cournot Marked the Turn from Classical to Neoclassical Thinking

Vernon L. Smith and Sabiou M. Inoua

ABSTRACT

For classical economists, markets served the highest value buyers without anyone in the market needing to know that it was possible to write aggregate buyer reservation prices in the form, $D = F(p)$. Cournot, thereby launched neoclassical economics as modelling and thinking of economic action in terms of their outcome effects, rather than their roots in human experience.

I. INTRODUCTION

Samuel Alexander, in his book *Beauty and Other Forms of Value*, revealed, in a brief commentary on Adam Smith and David Hume, his own insight into the deep insight that Smith brought to the task of understanding human conduct:

“Like the utilitarians who came after him...(Hume) looked ultimately to the effect of action in the way of giving pleasure or pain. Adam Smith, with a surer eye, declared the sympathy, which determines our approbation or disapprobation, not so much to be directed toward the effects of action as to the impulses from which the action proceeds. He considered our actions in their origins rather than their outcomes. (Alexander, 1933, p 249)

Alexander is referring specifically to *The Theory of Moral Sentiments*, and the roots of human sociality.¹ Generally, he is addressing alternative ways of thinking about observations and their

¹ Here is how the “surer eye” of Adam Smith, introduces the study of sentiments and human social conduct: “The sentiment or affection of the heart from which any action proceeds, and upon which its whole virtue or vice must ultimately depend, may be considered under two different aspects, or in two different relations; first, in relation to

meaning—the larger topic of this paper as it relates to social and economic action. Specifically, he refers to an analysis in which an individual’s utility function, as a representation of choice, links the individual’s “outcome”, in the form of experienced pleasure or pain, to the external “outcome” of choice as in a social or economic exchange. Thus, i has utility $U_i(x_i)$ where U_i is a measure of the individual’s preference for (pleasure or pain from) x_i , and x_i is the external “thing” or object of choice. Utility welded the internal outcome for the individual to the external outcome, and individual rationality became the source of socio-economic rationality rather than social and market collectives.

We have identified classical economics with Adam Smith’s way of thinking and modelling action that offers a means of contrasting classical with neoclassical (i.e., marginal utilitarian) economics, wherein the insights of classical economics were lost in the 1870s revolution. Neoclassical economics displaced rather than built upon the accomplishments of its predecessor. (Inoua and Smith, 2019) Herein we want merely to identify Cournot as defining the key turning point in economic thinking.

II. SOCIAL EXCHANGE

Smith’s model of human sociability led to propositions that apply naturally to our everyday interactions. Thus, your waste management service emptied your trash barrel on schedule; but you neglected to bring your barrel in from the street, and your neighbor brought it in for you. This illustrates Adam Smith’s concept of beneficence, one of the pillars of society, which governs our conduct according to the proposition: “Actions of a beneficent tendency, which

the cause which excites it, or the motive which gives occasion to it; and secondly, in relation to the end which it proposes, or the effect which it tends to produce.” (Smith, 1759, p 18)

proceed from proper motives, seem alone to require reward; because such alone are the approved objects of gratitude, or excite the sympathetic gratitude of the spectator.” (Smith, 1759, p 78)

As Smith explains this proposition, “proper motives” means intentional. Your neighbor deliberately brought in your barrel. She did not have to do it, but chose never the less to do it, and indeed, you feel a warm sense of gratitude. (Any third party “spectator” like another neighbor, would entirely concur and approve of what is transpiring next door.) So, you thank her, and—somewhat compellingly—give her three avocados freshly picked off your tree.

Adam Smith models conduct among strictly self-interested actors that generates, and predicts such other-regarding actions of good neighborliness that always arise from, depend and reflect their context-specific circumstances. (Smith and Wilson, 2019) Such rule-following conduct is what defines our particular forms (norms) of sociality. It not only springs from among self-interested people, it depends on common knowledge that all locally prefer more, and dis-prefer less. That is how you knew without a thought that your neighbor’s action was personally costly to her. In addition, you know that she benefits from three avocados. She knows her action benefitted you and that it was costly for you to give up the avocados. Without knowledge that we are all self-interested, we cannot implement Smith’s beneficence rule, enabling us to live in harmony with our neighbors.

III. ECONOMIC EXCHANGE

Smith’s insightful way of thinking about social exchange, however, carries over without qualification in principle to his second book on economic exchange, where, again, actors are all self-interested, except that their actions—usually, but not necessarily—are directly intended to satisfy that self-interest.

We first note that Smith distinguished value in use from value in exchange. Value in use is demand expressed in the market as a reservation price or maximum willingness to pay for a desired discrete quantity of a good or service. Value in exchange is the market price, where the “natural” price is a supply price that covers all costs including the profit necessary to bring it to market.

Smith begins by describing the experience of producer-suppliers who, knowing their cost, bring corresponding quantities to market:

“When the quantity of any commodity which is brought to market falls short of the effectual demand, all those who are willing to pay the whole value of the rent, wages and profit, which must be paid in order to bring it thither, cannot be supplied with the quantity which they want. Rather than want it altogether, some of them will be willing to give more. A competition will immediately begin among them, and the market price will rise more or less above the natural price, according as either the greatness of the deficiency, or the...eagerness of the competition.” (Smith, 1776, p 73-4)

Notice from Smith’s careful choice of words that he is describing the interactive experience of sellers and buyers, and their responses in their shared context. Sellers know the “whole value” of their goods necessary to recover their costs. Buyers, whose wants are not all satisfied at that whole value price, are willing to pay more rather than want for it. Depending on the extent of the deficiency and their eagerness, competition among the buyers will raise the price. Smith’s language describes the experiences and actions of the actors in the market, as he thinks about and models them. He is describing what a modern economist would say is excess demand, read off the supply curve and the demand curve as the economist visualizes them, in governing the Walrasian movement of prices. Smith does not use this modern language because it is not part of

the knowledge and experience of the actors. He describes behavior in its origins. There are indeed external outcome consequences for the people in markets and for society—no less than the causes of the wealth of nations!—*but none of that is part of people’s experience or intentions*. Smith’s thought process keeps separate these distinct effects. Similarly, and contrastingly,

“When the quantity brought to market exceeds the effectual demand, it cannot be all sold to those who are willing to pay the whole value of the rent, wages and profit, which must be paid in order to bring it thither. Some part must be sold to those who are willing to pay less, and the low price which they give for it must reduce the price of the whole. The market price will sink more or less below the natural price, according as the greatness of the excess increases more or less the competition of the sellers, or according as it happens to be more or less important to them to get immediately rid of the commodity.”² (Smith, 1776, p 34)

Following the thought pattern in Smith’s first book on social psychology, the words describe the experience and response of the economic actors—buyers and sellers—not the formal model of efficiency producing outcomes by the modern economist. The writings of the classical economists continued in this thought vein down to Cournot (1838). (Inoua and Smith, 2019)

IV. COURNOT

² Smith here distinguishes perishables from inventories of durables, going on to add: “The same excess in the importation of perishable, will occasion a much greater competition than in that of durable commodities; in the importation of oranges, for example, than in that of old iron.” The price today for a durable is limited in decline because it may command a better price tomorrow.

Cournot departed from this tradition, becoming the first in the long line of classical economists to write, quantity, $D = F(p)$, as the set of reservation price values, ordered from highest to lowest (supposed strictly decreasing), that uniquely map quantities into consumer values.³ Cournot announces that $F(\cdot)$ asserts the “law of demand.” Why not earlier? Smith clearly recognizes the existence of diversity across individuals in their willingness to pay for anything. Water is cheaper than diamonds because the latter is a monopoly that only sells to the highest value buyers. Similarly, iron has many entrant producers driving the price down and allowing lower value buyers to purchase it. At an auction, the buyer willing to pay the most is the purchaser of an item. Smith (1978, p 358; 1776, p 45)

We suggest that the classical economists focused on, and largely only on, the dynamics of price discovery based on the perspective, perceptions and experience of the traders in markets. No one in a market, nor does the collective in the market, need to know that the dispersed reservation values can be ordered from highest to lowest to yield a “demand schedule.” The market process easily and routinely picks out the high value buyers and low value sellers, dispersed in the crowd, and matches them; each gravitates to the other. At auction, the auctioneer uses English auction bid rules to find the highest value buyer in the room. Moreover, at every auction, all participants can infer, though may never envision, the “law of demand” for the number of active

³ For Cournot (1838, pp 45-6) the argument of the function $F(\cdot)$ is what people are willing to pay for the quantity D , as the classicalist economists before him had reiterated, but the words are “devoid of meaning,” without the explication he provides. Smith’s meaning, as we have argued in the text is clear, but Cournot wants to give aggregate content to the concept of “willing to pay”, as an ordered set, that is partitioned at D , and the higher values matched with the specific quantity that sellers supply (offer) against $F(\cdot)$. In this, Cournot is neither generous nor accommodating in his rhetoric as all the focus is on market outcomes.

bidder's declines monotonically as the price rises to higher and higher levels until the item is awarded to the last and highest bidder. The theorist, desiring to model the outcome consequences of a market's price discovery process, is the external observer motivated to write $D = F(p)$ and assert that D , determined by this function, is generally non-increasing in price, p . In the higgling and bargaining process if people are announcing bids and offers, the sellers will be eager to accept the highest bid prices they hear, and buyers the lowest sell offers they hear.

Cournot wrote $D = F(p)$ because, like Jevons (1871) and Walras (1954) who followed him, he did not have a completely specified mechanism for endogenous price discovery and thus reaching conclusions about efficiency and market performance.⁴ In this manner of thinking, Cournot becomes the first neoclassical economist, but his willingness-to-pay demand was classical to the core. Producer/sellers each chose a quantity to bring to the market. "The market" for Cournot was a black box for discovering clearing prices; the black box was a collective of buyers that found one and only one price that would clear the total quantity, D , brought to market. He was following Adam Smith—but could not model the process contained in the black box—in imagining a (D, p) outcome fix that jump-started the first attempted formal theory of a market.

Cournot's $D = F(p)$ was the break-through that introduced an outcome-modelling perspective, and economics would never be the same.

⁴ Jevons, unable to imagine an endogenous process of price discovery, assumed traders had complete information on supply and demand and the consequent clearing price. Walras, similarly handicapped, appealed to an external auctioneer who discovered the price before trading occurred. (Inoua and Smith, 2019) Motivated entirely by the findings in experimental markets, new theory seeks to fill this historical gap. (Anufriev, et al., 2011)

The first laboratory experiments in economics were born of the neo-classical tradition, but the results defied expectations based on mid 20th century neo-classical theory; inquiring as to a resolution led to a return to classical theory and its formalization. (Smith, 1962; Inoua and Smith, 2019, formally model classical value theory.)

V. HUME VS SMITH; A PROPHETIC DISAGREEMENT.

Significantly, Smith reported a disagreement he held with his close friend David Hume, a disagreement that was prophetic of neo-classical things to come. (Smith, 1759, pp 179-188) Smith discovered the mainsprings of human sociality, systematically modeled them in terms of the “Sentiment of Approbation,” and characterized them as an emergent social order of rules. Though founded on self-interested actors, no part of the model was utilitarian. People came to other-regarding action via self-command in their adherence to general rules arising voluntarily in a collective process of mutual simultaneous discipline. Fellow feeling was the gravity that shaped and bound.

Hume recognized that sympathy is the sole ultimate source of our happiness. “We can form no wish, which has not a reference to society.... Every pleasure languishes when enjoy'd a-part from company, and every pain becomes more cruel and intolerable... Let all the powers and elements of nature conspire to serve and obey one man... He will still be miserable, till you give him some one person at least, with whom he may share his happiness, and whose esteem and friendship he may enjoy.” But for Hume, in all such orderly systems “their beauty is chiefly deriv'd from their utility, and from their fitness for that purpose, to which they are destin'd.” (Hume, 1740, pp363-4)

For Smith, however, it was the other way around; what is wanted, “it seems, was not so much this conveniency, as that arrangement of things which promotes it... and bestows upon it the whole of its propriety and beauty.” (Smith, 1759, p 180)

Hume elsewhere refers to the emergence of property (justice) as having its origin in efficiency:

“Nor is the rule concerning the stability of possession the less deriv’d from human conventions, that it arises gradually, and acquires force by a slow progression, and by our repeated experience of the inconveniences of transgressing it.” (Hume, 1740, p 490)

Smith identified the origin of property in his proposition on justice, wherein actions that are intentionally hurtful to others, provoke resentment, and a desire to punish the action. Hence, the origin was in feelings of resentment leading to the emergence of rules that naturally and rightly were part of the civil order of community, long before their adoption by governments.

Smith doubted not the efficacy/efficiency of these rules, but in contrast with Hume, understood that this undoubted external achievement failed to explain why we follow them.

“In every part of the universe we observe means adjusted with the nicest artifice to the ends which they are intended to produce...But in these, and in all such objects, we still distinguish the efficient from the final cause... When by natural principles we are led to advance those ends, which a refined and enlightened reason would recommend to us, we are very apt to impute to that reason, as to their efficient cause, the sentiments and actions by which we advance those ends.” (Smith, 1759, p 87)

Hume’s rational reconstruction is an important feature of human inquiry and understanding, but it is distinct from the origins of our actions. Utility theory redefined agent action in terms of its

outcome, which was the assumed origin and purpose of action.⁵ Rationality thus was a phenomenon that began with the individual, and ended with the sum of what individuals did.

VI. CONCLUSIONS

Cournot's treatment of demand was at the center of the classical tradition of aggregating the reservation values revealed in the individual's willingness to pay for discrete units of consumer goods. For the first time, however, he expressed demand as $D = F(p)$, because he sought a theory of market outcomes that would speak to a market's external efficiency and performance for society. Markets, as the classicalists understood, easily served the highest value buyers (lowest value sellers) without anyone knowing the ordering rule, $D = F(p)$. We argue that Cournot's exercise launched the distinguishing feature of neoclassical economics: modelling, and therefore thinking of economic action, in terms of its outcome consequences, as distinct from its roots in human experience. Classical economics sought understanding of market processes from the perspective and experience of the actors. Hence, neoclassical economics floundered in accounting for market price discovery. Inadvertently, experimentalists, educated in the new tradition, were intellectually unprepared for the results of the first laboratory experiments wherein naïve subjects, informed only of their own private reservation price values, easily discovered efficient clearing prices that were no part of their intention.

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⁵ Utility representations were a reasonable hypothesis to pursue, justifiable if it brought new predictable results, not already implied in traditional modeling, but this is doubted by the challenges in Friedman et al. (2014)

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