Marginal Revolution: Jevons and Menger.

Marginal Revolution

The rediscovery of the marginal principle revolutionized the theory of value. Jevons, Menger, and Walras all independently formulated a theory of exchange value based on the theory of diminishing utility.

The uniting theme across the works of Jevons, Menger, and Walras is their reliance on marginal utility as opposed to the cost of production as the determinant of exchange value. The marginal theories are subjective theories of value as opposed to the objective theories of Classical Political Economy.

Walras was the most mathematically inclined of the first generation of marginalists. He was concerned with the formulation of general equilibrium equations. The notion of general equilibrium was not new to economics; in fact, Quesnay and the Physiocrats were early pioneers of the idea of general equilibrium for the entire economic system. The notion that value derives from utility and scarcity was present tin the work of J.B. Say.

Walras invited a young Italian thinker Vilfredo Pareto to succeed him at Luasanne. Pareto adopted Walras's notion of static general equilibrium and incorporated indifference curves, introduced earlier by Francis Edgeworth, to define the nature of the economic optimum.

Menger, the Austrian, was the member of the first generation of marginalist whose work had the greatest immediate impact. In fact, an entire school formed in the tradition pioneered by Menger and included influential economists like Bohm-Bawerk who opposed an historical approach in favor of theoretical. The Austrian intellectual influence effectively diminished the sway of Marx. Distinguishing the Austrians from other early marginalist is their preference for a literary approach as opposed to the more rigorous mathematical approach of Jevons who utilized calculus and Walras who invented general equilibrium equations. Regardless of the difference, all of the early marginalists focused on individual utility maximization as the key to understanding value.

Walras was the marginalist that exerted the greatest influence on European economic thought. THe general equilibrium analysis focuses on interdependencies among markets, asserting that the valuation process occurs simultaneously across all markets. The general equilibrium approach continues to dominate economic thinking today.

Economics of William Stanley Jevons

The influence of Bentham's felicific calculus is apparent in the work of Jevons. Jevons defines a commodity as an object, action, or service that affords pleasure or reduces pain and utility as the abstract quality of an object that serves our purpose. In pursuing utility, sacrifices must be made, and disutility must be incurred. Jevons asserted that the water-diamond paradox that puzzled thinkers since Smith could be untangled by directing the theory of value away from the cost of production towards a mathematical and subjective approach.

Recognizing that utilities and quantities should be viewed from the marginal perspective through the use of differential calculus, allows Smiths error to be resolved. Jevons posited that marginal utility is a

diminishing function of the quantity in the consumers possession. Where water is plentiful, and diamonds are scarce, marginal utility helps understand why no one would trade water for diamonds.

Utility decreases with each increase in quantity held. Individuals will exchange additional units of someone else's stock of commodities until each induvial has exhausted any gains from trade. Equilibrium is achieved when the ratio of exchange of two commodities is he reciprocal of the ratio of the utility after exchange has exhausted all gains.

Limits of exchange.

Assume two people who will engage in trade begin with an initial endowment. Person 1 has a stock of corn denoted by *a.* Person 2 has a stock of beef denoted by *b.* The two agents in the model exchange successive small increments of the commodity owned for successive small increments of the commodity they do not own. Assume further that the market is purely competitive with an established exchange value of *x* for corn and *y* for beef. The ratio of exchange is *dy/dx = y/x.*

After exchange, person 1 will hold *(a-x)* of corn and *y* of beef. The other person will hold *x* of corn and *(b-y)* of beef.

Let *f(a-x)* and *g(y)* represent the marginal utility of corn and beef to person 1; similarly, let *h(x)* and *j(b-y)* represent the marginal utilities of corn and beef to person 2.

Maximum satisfaction is represented by equation 1.

$$\frac{f(a-x)}{g(y)} = \frac{y}{x} = \frac{h(x)}{j(b-y)}$$

While Jevons sought to demonstrate the limits of maximum exchange, the equimarginal principle also demonstrates how a rational consumer should allocate their income. The consumer should allocate their income so that the marginal utility of the last cent spent on good A is equal to the marginal utility of the last cent spent of good B. If the marginal utilities are not equal, the consumer could raise total utility by reallocating income towards the good that provides greater marginal utility. The loss of utility from giving up some of the good with lower marginal utility would be less than the gain received from taking more of the good with higher marginal utility.

The equimarginal principle does not imply equal amounts are spent on the two goods; rather, it implies that differences in expenditure are balanced by differences in utility. The rational allocation of expenditures on any pair of goods will yield the proportions presented in equation 2.

$$\frac{marginal\ utility\ of\ good\ A}{price\ of\ good\ A} = \frac{marginal\ utility\ of\ good\ B}{price\ of\ good\ B}$$

Which is equivalent to equation 3:

$$\frac{margianl\ utility\ of\ good\ A}{margial\ utility\ of\ good\ B} = \frac{price\ of\ good\ A}{price\ of\ good\ B}$$

The concept of the trading body

Jevons draws on the concept of the trading body and the law of indifference to extend the subjective valuations of two traders to many traders engaged multiple exchanges and the formation of market price.

The trading body is the aggregate of buyers and sellers in a competitive market.

The law of indifference asserts that there is a uniform exchange rate between pairs of commodities.

Figure 3 is similar to a graph used by Jevons to supplement his logic. Trading body A has stock of beef a and incrementally exchanges with trading body B who has stock of corn b. The quantities of commodities are measured along the horizontal axis and the marginal utilities are represented by the curves *MU corn* and *MU beef.*
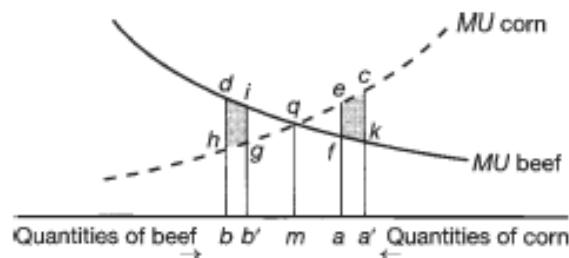
Jevons's consumer equilibrium with fixed stocks.

Figure 1

In the figure, assume an increase in the quantity of corn held by A which is represented by $a'a$. THe increase in corn implies a decrease in beef which reduces utility by the amount *afka'*. The marginal utility from increased corn is represented by *aeca'*. The gain from increased corn is greater than the loss from reduced beef, thus the trade *kfec* yields a net gain. Trading body B also has a net gain from the trade; he gain to B is given by the area *hdig.* Both bodies will continue to trade until all gains are exhausted and equilibrium is reached at *m.*

 Note, we are assuming that the utility functions are continuous and that the utility of individuals are additive. The other assumption made by Jevons, which is perhaps the most troubling, is that the equilibrium exchange ratios are assumed. The ability of a utility fucniton to explain relative prices is limited to the very special case of given commodity stocks. The marginal utility explanation of market price is only valid when supplies are given. This shortcoming will be circumnavigated by Alfred Marshall who solved the price determination problem through the interaction of the schedule of demand and the schedule of supply.

Jevons on the supply of labor

Jevons extended his theory of utility to explain the relationship between the supply of labor effort and the disutility of work. The worker is posited to trade the disutility of work against the utility of real wages received for that work.
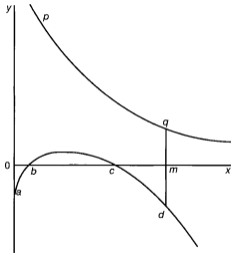
Jevons's illustration of the net pain of work.

Assume that the measurability of utility and disutility can be measured and is presented along the vertical axis. The utility of real wages declines continually along a curve like *pq.* The utility inherent in work, measured on the horizontal axis, initially offsets the disutility of exertion. The pain of labor relative to output is represented by the curve *abcd;* eventually the pain of work overcomes the utility as net pain increases over the range. The worker will produce not more than *om* where the marginal utility of the real wage is equal to the net pain of labor.

Carl Menger on Subjectivity of value and negative imputation

Menger placed even greater focus on the subjective aspects of value than did Jevons.

We begin with human want for an object and characteristics of an object that can satisfy this want. Consumers are aware of the want-satisfying power and have the object at their disposal. Objects that have the characteristics that satisfy human wants, Menger posits, tend to be fewer in quantity than needs would dictate, thus people economize in their use. Since all wants cannot be satisfied, people are assumed to rank their in order of importance.

The table presented here demonstrates the hierarchy of wants, denoted by roman numerals I to X, for an individual consumer. The Arabic numbers in the columns represent the satisfaction of an additional unit of the want-satisfying good. Notice that the there is diminishing want-satisfying power of additional units of the same good. Additions will halt when the marginal increment becomes zero.

Number of units consumed	Type of commodity									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1	10	9	8	7	6	5	4	3	2	1
2	9	8	7	6	5	4	3	2	1	0
3	8	7	6	5	4	3	2	1	0	
4	7	6	5	4	3	2	1	0		
5	6	5	4	3	2	1	0			
6	5	4	3	2	1	0				
7	4	3	2	1	0					
8	3	2	1	0						
9	2	1	0							
10	1	0								
11	0									

The recognition by Menger of the importance of the relationship between quantity needed and available supply would allow him to present a solution to the water diamond problem. Drinking water is abundantly available.

Menger devised an alternative approach to explaining the value of goods that satisfy consumer needs; goods that satisfy consumer needs are termed goods of a lower order. Goods of a higher order, which in

contemporary economics are factors of production, have their value determined by negative imputation from the anticipated value of the goods of lower order whose production they serve.

The theory of imputation developed by Menger challenges the classical explanation of income shares, especially of interest as a reward for abstinence. Capital is considered a good of a higher order. To impute the value of higher order goods, withdraw one unit from production and measure the reduction in utility from lower output. The loss of output is the marginal product of whatever variable factor is being considered. The utility of the product foregone determines the value of the good in the higher order in the production process.

Conclusion

We saw earlier that classical thinkers were concerned with economic growth resulting from self-serving behavior of individuals and businesses. The marginalists focused more on the optimizing behavior of individuals. Using marginal utility, the marginalist deduced exchange ratios in competitive markets, allowing them to establish the link between value in use and value in exchange.

The marginalists did not explicitly attack the weakness of a labor theory of value, they noted some deficiencies. First, a large expenditure on labor does not necessarily increase the value as it is possible that the forecasted future demand may be inaccurate. Another weakness pointed out was that a labor theory of value cannot explain the value of land or objects that exist in permanently fixed supply, like works of art.

The focus on marginal utility as the determinant of exchange value is undoubtedly a chief feature of the marginal revolution. However, it is not the only significant feature of the marginal approach. The marginal revolution met staunch resistance in England. Menger and Walras had a different experience on the continent. Menger's Austrian approach and Walras's Lausanne tradition brought different notion of equilibrium than the long run equilibrium towards which the system tends as it moves through historical time.

Another big difference distinguishing the Austrian analysis from the classical is the conception of capital. Menger interpreted the determination of higher order goods as a reflection of the valuation that consumers placed on lower order goods. The negative imputation was challenged by the second generation of Austrians; they claimed that removal of a higher order good changes the proportions and productivity of the remaining higher order goods and thus the change in output is not due solely to the withdrawal of an individual unit of the factor in question. Menger also never considered if this method of valuing factors would exhaust the total product, an important question for distribution.