What Should Economists Measure? The Implications of Mass Production vs. Mass Customization

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"What Should Economists Measure? The Implications of Mass Production vs. Mass Customization"

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What Should Economists Measure? The Implications of Mass Production vs. Mass Customization

In the early days of mass production Henry Ford remarked: "People can have the Model T in any color—so long as it's black." But in today's mass customization economy the consumer can choose among 1200 different vehicle styles.[1] Examples in other sectors are equally robust. Jeans, shoes, eyeglasses and more come in personalized pairs. Consumers can have their own personal collagen cloned and injected to remove wrinkles. Even a staple product like milk comes in many varieties—with or without hormones added. Via the Internet, immigrants can listen to radio from virtually any homeland. Over 170,000 different software programs now exist to fine tune increasingly every aspect of customer choice.[2]

Microeconomic theory has reflected this change. Indeed, it has been over two decades since the classic paper by Dixit and Stigltiz (1977) showed that profit maximization and free entry can lead to optimum product diversity in a monopolistically competitive environment. This work implies that the utility consumers enjoy from mass customization is not registered by GDP. While the measurement problems of GDP are well known (Krugman, 1998), the dramatic implications of mass customization for what economists should measure are not widely appreciated. Simple, well-established economics shows that even if we could properly account for the measurement of quality (Nordhaus, 1994), GDP registers only technological improvements that lower the *marginal* cost of producing existing goods.

Drawing on the work of Krugman (1979, 1980, 1981), this note seeks to tell the story with a one-paragraph derivation of the basic Dixit-Stiglitz-Krugman model of monopolistic competition. The basic theorem is that as the *fixed* costs of creating new products fall toward zero, utility soars to infinity while GDP remains constant. We hope that a shorter and different derivation of this old result will focus attention on the distinction between mass production and mass customization and offer one explanation for the Solow Paradox—that "you can see the computer age everywhere but in the productivity statistics" (Solow, 1987).

The Krugman model can be expressed as follows. There are n products with identical labor cost functions of the form $\alpha + \beta x$, where α and β are the fixed and variable costs and x is the output of each product. The utility function is of the form $u = n^{1/\theta}x$, which is a reduction of the function $u = [\Sigma(x_j)^\theta]^{1/\theta}$ for the case of identical cost functions and identical market behavior for each good. We assume, of course, that $0<\theta<1$. In markets we know that the price of each product will be the same, which we arbitrarily set = 1. The labor supply is inelastic and also set equal to 1. It turns out that the monopolistically competitive solution under these circumstances is led by an invisible hand to maximize utility subject to the resource constraint[3]. To show this we maximize the Lagrangian with respect to n and x:

(1) $H = n^{1/\theta}x - \lambda(1 - n\alpha - n\beta x).$

where $1 = n(\alpha + \beta x)$ is the resource constraint. Thus, we obtain the Krugman decentralized solutions:

(2) $n = (1-\theta)/\alpha$

(3) $x = \theta\alpha/\beta(1-\theta).$

Inserting these into the utility function yields

(4) $u = [(1-\theta)/\alpha]^{(1-\theta)/\theta}(\theta/\beta).$

Income (GDP) is simply

(5) $y = nx = \theta/\beta.$

Implicit in this model is the assumption that the quality of goods is measured perfectly. Lower fixed costs allows goods to be customized to the tastes of the consumer whereas the lower variable costs of mass production methods allows more of each good to be produced. But the difference is dramatic: as variable cost, β, goes to zero, both utility and GDP go to infinity. However, as fixed cost, α, falls to zero, utility goes to infinity while GDP remains constant.

It's worth remembering that a market economy strives to raise our living standards—not simply GDP—because that's where business' profit lies. Aggregate output (and its derivative, productivity) may have been an adequate gauge of economic progress when such innovations as the assembly line, standardized nuts and bolts, electricity and motors cheapened the process of mass production. But GDP certainly understates today's progress where innovations such as the microchip, the personal computer, the Internet, genomics, and fiber optics make possible an era of mass customization. "Once you know exactly what you want, you'll be able to get it that way." (Gates, 1995, p. 166). Henry Ford meet Bill Gates.

The moral of our story is simple. A great deal more effort should be put into measuring the utility that consumers derive from the tremendous variety of goods and services that are available today versus yesterday so that we can more accurately assess the decade-by-decade progress of a dynamic, evolving economy.

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Endnotes

1.Data obtained at Internet site <http://www.dealer.net.com/>.

2.Unpublished data obtained in conversation with SoftSearch Software Information Services. See Internet site <http://www.softsearch.com/>.

3.Compare Lerner (1943) who shows that equal monopoly markups in all sectors yields Pareto-optimality if resource supplies are fixed. Our result is somewhat different because Lerner takes the number of goods as fixed.

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