

Richard G. Anderson¹, “Economics and the Real World,” remarks at Colorado State University on the occasion of the initiation of new members to Omicron Delta Epsilon, April 26, 2005.

When Professor Phillips invited me to give this address, he offered no suggestion regarding what to say. I chose “Economics and the Real World,” for two reasons. First, to emphasize to you the power of the economic tools you have spent the last several years learning. And, second, to stimulate, I hope, your interest in the area of economic growth, development and productivity.

Economics is a social science. To professional economists, it seems the queen of sciences. We build theories within a clear frame of reference: that human behavior can be explained as optimization subject to constraints, and that those constraints embody the relevant prices. Often, we seek to apply such models to policy questions. We amend our models, in an iterative way, to include features that address the market failures we seek to overturn. Done correctly, the solutions to those models provide us with first-order conditions that define the trade-offs among various goods and services, both at a point in time and at different points in time. When stochastic elements are added, we can discuss tradeoffs between risk and uncertainty within the same paradigm. Finally, the proof is in the eating: To be useful, the models must have empirical implications that can be confronted with data. Economics survives because often the data are consistent with the model’s predictions.

Economics embraces other social sciences because our models cannot be rich or detailed enough to include everything—if so, they wouldn’t be models but would be

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reality itself. Political science, psychology (the 2002 Nobel Prize in economics was awarded to a Princeton University psychologist), sociology—all are welcome because they assure that our models are not widely at odds with the world. Remember: Failure to reject the null hypothesis does *not* guarantee that the alternative hypothesis is true!

Modern economics embraces mathematics as a language in which to communicate. Such has not always been the case, as long-suffering students have learned while deciphering John Keynes writings in macroeconomics. The title page of Paul Samuelson's dissertation, *Foundations of Economic Analysis*, published in 1947 but completed before World War II, includes the quotation, "Mathematics is a language," attributed to Professor J. Willard Gibbs. Gibbs was a prominent nineteenth-century Yale professor of engineering and one of America's pre-eminent mathematicians—the American Mathematical Association continues to sponsor an annual lecture in his honor. Although the precise context of Gibbs quip seems to have been lost, reports are that he uttered these words in frustration during a Yale faculty meeting. Economics is not engineering. Economics is not mathematics. Economics is not statistics. And, as Kenneth Boulding once wrote, it is difficult to say "I Love You" in mathematics. But, the economic behavior of society is so complex that modeling even portions of an economy requires *both* social sciences and mathematics. Not an easy field to conquer. Economics is a toolbox, economics is a craft, and economists are craftsman. Deciding which tools are appropriate to a project is the task of all craftsman.

Many non-economists—including politicians—take a jaundiced view of the potential contribution of economics. Sometimes, the conclusions of economic reasoning offend common sense. And, why is this? Good economic reasoning should be

developed from a clear rational choice framework, that is, a clear objective function and constraints. Doing so guards against the human tendency—too often, in my opinion, reflected in US elections—for human beings to believe that simple answers exist to complex problems, and that the greatest challenge is only to find those answers. In Missouri, professional economists sometimes worry about President Truman’s dictum to bring him a one-handed economist—such demand threatens to create new supply! But, seriously, “common sense” is frequently a poor guide to the right answer in economics.

Consider the case of technological progress. If the social objective function includes only the lifetime earnings of current workers in existing industries, increased international trade likely will be valued little, if at all. But, if the function is extended to include better jobs for students entering the labor market—including the children and grandchildren of current workers—the answer is quite different. The historical record for more than 900 years suggests a strong correlation between increased trade and a higher standard of living.

Consider our labor markets. Many, if not most, of you this afternoon are hoping for stable employment starting in a few weeks or months. If I asked, I suspect most of you would respond that stable, steady, meaningful employment perhaps is the least we should expect from a well-functioning economy. Yet, you would be wrong. Healthy market economies experience enormous churning in their labor markets. Jobs are created and destroyed at prodigious rates. In the United States, for example, each quarter, 8 percent of jobs that exist at the end of a quarter did not exist at the end of the previous quarter. Each quarter, some 12 percent of the labor force—14 million persons—change jobs (albeit perhaps not employers). Each week, almost a quarter-million persons lose

their jobs and file for unemployment insurance. Such misery! A year ago, I was talking at a conference with a European economist when the weekly U.S. claims for new unemployment benefits numbers were released. The figures showed that some 300,000 persons had filed for unemployment insurance benefits. After a moment's pause, his reaction was horror: How could the United States tolerate an economy where more than 1 million people each month lost their jobs? What can be done? Actually, nothing. Attempts to reduce turnover in the labor market, such as in late 20th century Japan and Europe, often take the form of restrictions against firms laying off workers. Stagnation is the result. Only practitioners of a dismal science would suggest that misery for individual workers, when combined across the entire economy, will result in more prosperity for all... but economics suggests it will.

The social problem, then, is how to share the increased prosperity that results from churning—whether due to trade, changes in consumer tastes, or technological advance—throughout the economy, including with the displaced workers. Again, what does economics say? Naïve models, those that omit transactions and adjustment costs, likely would argue for the market to be left alone—after all, the displaced workers will gain new jobs in new firms, and won't those new jobs be more productive than the old ones? Deeper models would include notions of firm-specific human capital, of displaced workers seeking jobs within a set of heterogeneous agents, and of firms reluctant to accept older workers who need new skills because the effective annual “depreciation” rate of such capital is high for workers nearing retirement. Deeper dynamic models might note the repeated-game nature of such events—it's your industry this year, but it might be my industry next year—and discuss the role of a central government as a means

to share economy-wide non-diversifiable risk of change across geographic areas and industries, and through time.

Consider, next, international trade. One of my colleagues has written several excellent papers on the subject of why the views of the public and politicians on increased trade—globalization—differ so much from those of professional economists. The proverbial 800 pound gorilla now is China. We travel several times a year to cities in our district to give talks on the economic outlook. Increased trade is a common topic. For business owners, the important issue is selling in competition with other businesses; pressures to offer a lower price drive them to outsourcing abroad, where costs are lower. For workers, the issue is jobs—similar to the business owner, they feel pressure from abroad but in this case on their wages and employment status! I sometimes say that an American worker who has only the same skills as a worker in Mexico or China can expect, as globalization proceeds, to earn, in real terms, only as much as those workers.

Is, therefore, international trade a zero-sum game? Is our economy harmed by shifting industrial production to China and computer programming to India and Poland? An economist, falling back on his toolkit, might ask: Suppose I shift automobile production from Michigan, where wages and other costs are higher, to Alabama, where costs are lower. Is the economy injured? The answer in Michigan likely is yes; the answer in Alabama likely is no. But, suppose now that production of certain component parts is shifted from Alabama to China—are the answers the same? Economically, yes: in the near term, Alabama is worse off and China is better off. But, the lower production costs now place downward pressure on all producers of such parts. As a result,

automobile prices decrease, and more cars are assembled. Again, on the one hand, some gain, and on the other hand, some lose. Such is the wisdom of studying economics.

These are essential parts of “the real world.” In textbooks, economies grow relatively steadily along trend lines, while fluctuating modestly at business-cycle frequencies around such trends. Often, such textbook models are given “microfoundations” by assuming the existence of a “representative” single household and single firm. Such theoretical constructs have value, but they are not the real world.

Robert Solow—the Nobel Prize-winning M.I.T. economist, one of my favorite graduate-school teachers, and a sailor—once remarked that a model of an economy is useful in the same way as a model of a battleship: you can’t fight a war with a model of a battleship, but you might learn a great deal about battleships. In real economies, no one should make policy decisions based solely on abstract models—great errors can result. But, models do help us understand *some* parts of the tradeoff. Even here, there is a trade-off. Someone who eschews models entirely *cannot* carefully apply the economic tools of rational choice subject to constraints. Absent the model, what does it mean to specify an “objective function”? How does one specify the constraints? And, how does one judge when, or if, some or all of the constraints are binding? And, without such knowledge, how does one obtain the holy grail of the (perhaps dynamic) first-order conditions which, in economic models, define the tradeoffs? Anyone who says they practice modern economics but does so without models is a charlatan.

In the real world, economics faces the reality of social contracts between the more fortunate and the less fortunate, and between the governed and those who govern. It is a challenge to address the differences among countries—and especially between the United

States and Europe—in the framework of rational choice, optimizing economic models. In that regard, I commend to you Roland Benabou's paper in the *American Economic Review* five years ago. Economics faces the reality that slowing the churning within the economy, so as to buffer those inside, is likely to slow its forward progress. Discussions of economic stagnation in Europe have been commonplace for decades. Some analysts have argued that adjustment in Europe has been slowed by employment rules and unemployment compensation schemes that reduced labor churning but also increased employment stability. How much of each to choose is a society's decision beyond economics—we can only specify the tradeoffs.

Becker and Posner

In the Real World, there are many prominent examples of economists who have stretched the Economics paradigm. One of my favorites is the University of Chicago's Gary Becker.

Becker has applied the tools of economics to a wide set of social issues. In 1992, the Nobel Prize committee cited him "...for having extended the domain of microeconomic analysis to a wide range of human behaviour and interaction, including nonmarket behaviour." He has explored persistent racial and sexual discrimination, investment in human capital, crime and punishment, marriage and divorce, the family, drug addiction, automobile insurance, and the value of college education. Often, Becker is referred to as a leader in "unconventional economics" because of the social issues he addresses. I suggest the opposite. He uses the most conventional, and very sharpest, of Economic tools to explore these issues: specifically, that individual behavior may, almost

everywhere and at almost all times, be interpreted as *economic* behavior, that is, as if the individuals seek to maximize their well-being subject to constraints (and costs). His 1975 book *Human Capital* addressed the question of why a substantial part of economic growth remained unaccounted for after subtracting the contributions of labor and capital. He suggested that “human capital” accounted for a large part of the residual and, hence, that spending on education should be modeled as a form of investment. His newest book extends earlier models by including society-wide variables in individual utility functions, providing new formal tools for discussing inter-dependent utility.

World Economic Growth

Last year, the world economy’s output of goods and services grew almost 5 percent, a record. But, this growth was widely uneven across nations. I would like to ask two questions regarding such growth: (1) how are growth differentials related to the social contracts in countries, and (2) can we apply our model of “optimization subject to constraints” to this problem?

Just yesterday, the American Economic Association awarded its John Bates Clark medal for the best economist under age 40 to MIT’s Daron Acemoglu. The prize was awarded for his work in growth theory, perhaps the most fascinating areas of economics. What factors determine a nation’s long-run standard of living? Certainly, natural resources matter: mineral wealth, soil, fuels, fisheries, climate, navigable harbors, etc. Certainly, the legal structure matters: protection of individual property, including intellectual property, and a socially agreed on means of conflict resolution. And,

certainly, the economy might be organized through highly unregulated, competitive markets or, in some cases, through heavily controlled government actions.

Acemoglu's work suggests that, among many inter-related indicators, the key indicator of a country's future growth is its system of political and social institutions. His theoretical work supports and extends the remarkable historical data compiled during the last 30 years by Angus Maddison, the world's leading macroeconomic historian. We all recall that some civilizations that were rich in one era are poor today. Why does this happen? How is this consistent with optimizing economic behavior?

Generally, a country's institutions change very slowly. There are exceptions: colonial conquest, or military invasion, often leads to dramatic change. Imposing any political system creates winners and losers. Human rights—tolerance of views different from one own's—is an important issue, as is the democratic nature of the system. To remain in power, whether with the consent of the governed or not, winners temper their rule; others, most often, remain subservient so long as living conditions are tolerable. (But recall the British in India.) Through time, ruling groups tend to expand their coalitions, "buying" friends and further entrenching themselves. In the extreme, crony capitalism stifles growth. All of these outcomes are susceptible to analysis with our economics toolkit. The political structure interacts with economics, affecting incentives for the government to offer education and for citizens to accept it. In turn, the political and legal systems affect the accumulation of human and physical capital, and the growth rate for the economy.

It is difficult to under-state the importance of Becker's human capital ideas for modern economic growth theory. The modern theory of economic growth began with

Robert Solow's seminal 1956 paper. (Here, the term "modern" is synonymous with using the modern language of economics – mathematics – to be precise regarding objectives, assumptions, constraints, and dynamics.) Growth theory now underlies dynamic macroeconomics, with business cycles being analyzed as fluctuations within a growth context. Growth theory provides a basis for studies of taxation, international trade, monetary and fiscal policy, and social insurance.

Growth theory, over long periods of time, suggests that the wealth of countries should converge. International trade in goods, services, labor, capital and knowledge all hasten such convergence. Yet, the story of the last 1000 years has not been one of convergence. The work of Angus Maddison and others suggests that the standard of living of most of the world's population changed little from earliest recorded time through approximately 500 years ago, and then increased only modestly until 200 years ago. Certainly, differences existed across civilizations—not everything was equal. But, increases in real output generally were matched by increases in population—while some countries were richer than others, none had large sustained increases in real output per capita. Differentials in the "wealth of nations" were small, and unchanging.

This state of affairs changed with the industrial revolution. By happenstance or blessing, some nations began to grow more rapidly than others. More rapid growth brought (slight) increases in the standard of living, which was followed by decreases in population growth rates. In turn, slower population growth was accompanied by increased accumulation of human and physical capital. Fewer children were born, but those children lived longer and were better educated. As a result, nations that already were among the fastest growth grew even faster. Today, the gap between the world's

richest and poorest countries is more than 25 to 1. Two hundred years ago, it was no more than 2 to 1. Five hundred years ago it was 1.1 to 1.

Robert Lucas, again of the University of Chicago, has noted that the most spectacular growth successes of the post-WW II era have been associated with growth in international trade: Japan, South Korea, Taiwan, Hong Kong, Singapore, and, most recently, China. Countries that cut themselves off from the world stagnated—not only did they lose advantages from trade, they lost the advantages of a free flow of knowledge. Some of these countries have been more democratic, others less so.

Growth theory applied to the US economy of the last decade again points to increases in technical knowledge as an engine of growth. Improvements in manufacturing—learning and technical progress—have led to sustained 20 to 30 percent per year decreases in the quality-adjusted prices of IT business equipment. Prior to 2000, IT-producing industries led the gain in productivity, although other sectors shared some gain. But, since 2000, improvements in the application of technology—again, learning and technical progress—have led to sharp increases in productivity growth technology-using sectors such as retail and wholesale trade, and financial services.

Knowledge has an economy-of-scale effect: each participant in the economy can use each piece of knowledge without detracting from others knowing the same knowledge, leading to growth spurts and surges. Recently, controversy surrounded Paul Samuelson's comment that modern international trade theory does not guarantee that all participating nations gain from trade. When one nation is more technologically advanced than the other, and technical knowledge can be exported and shared, comparative advantage across countries may change in complex ways. It is quite possible for the

initially wealthier nation, even though it concentrates in areas with competitive advantage, to gain little from trade. The analysis is further clouded by the production of new knowledge: Suppose technical knowledge is a good to be produced, like all other goods—improvements in metallurgy, improvements in financial engineering, etc. If so, then the outcome depends on the ability of the lead country to maintain its advantage in producing technical knowledge. To the extent this depends on a relatively free intellectual and political system, the economic analysis cannot stand alone without input from political science and other social sciences.

Although Samuelson doesn't discuss Angus Maddison's work, his comments are in line with Maddison's long sweep of macroeconomic history. Going back to 1000, Maddison estimates that GDP per capita was *lower* at that time in Europe than in Africa, Asia, and Japan—although the lowest was within 90 percent of the highest, approximately a 1.1 to 1 ratio. As early as 1100, with the Renaissance in Italy, Europe began to pull ahead in both the *production* and *use* of knowledge. By 1500, Europe was quite far ahead of other parts of the world. Maddison cites the development of navigation, military technology, banking, accountancy, marine insurance, improvements in the quantity and quality of intellectual life with universities, and the introduction of the printing press. Until approximately 1560, Italy was the richest country in the world in terms of per capita real output, with real GDP per capita approximately one-third greater than its closest rival, the Netherlands. The Netherlands passed Italy during the sixteenth century, and remained the world leader until surpassed by the UK and the industrial revolution circa 1830. Shortly after the start of the twentieth century, Britain was replaced by the US. Maddison argues that the US political and social systems have

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allowed it be the world's leader in the production and application of knowledge, contributing to the ever widening gap between GDP per capita in the US and the rest of the world.

Much more modeling remains to be done before we will understand *why* these developments occurred in western Europe, and why they occurred when they did. Much additional modeling also remains before we can adequately understand increasing international inequality. But, there is little doubt that Economics, in its broad scope, *is* the real world.