
BOOTH

# Kevin M. Murphy

The first thing you notice about Kevin Murphy is the baseball cap. Amid the imperious architecture and soaring intellects (or vice versa) of the University of Chicago, the cap is disarming. It immediately sets you at ease. *This* is a guy you can talk to, somebody who grasps everyday reality and speaks in plain language. Not, it would seem, an economist.

But, of course, Murphy is one of the world's finest economists. In 1997, he received the John Bates Clark medal, awarded to the most promising economist under the age of 40. A year later he was elected to the American Academy of Arts & Sciences, rare for an economist so young.

In 2005, the MacArthur Foundation gave Murphy one of its so-called genius grants in recognition of his research on "seemingly intractable economic questions, placing them on a sound empirical and theoretical footing." And in 2007, he won the prestigious Kenneth J. Arrow award for work on the economic value of health and longevity. "He's brilliant, very brilliant, and I don't use that term often," said Nobel laureate Gary Becker in 2006. "He is at the top ranks in economics."

Despite the accolades, Murphy remains remarkably well-grounded. Indeed, he's been virtually rooted at Chicago since arriving as a grad student in 1981. (He made full professor just three years after getting his doctorate.) Close colleagues are part of the reason for staying put; his office is sandwiched between Becker's and Robert Topel's, his two most frequent co-authors.

Moreover, as the baseball cap might suggest, Murphy has always focused more on work than reputation. And that work—research on inequality, addiction, unemployment and economic growth, among other areas—is proof of the power of investing in human capital, from a man who worked full time in a grocery store to put himself through college.

Photography by Marc Norberg

## INEQUALITY AND ECONOMIC GROWTH

**Region:** Let me start with a 2001 paper that you wrote with Finis Welch, which built on previous work you had done with him and others. You review trends in wage inequality over several decades and show that a coherent story of supply and demand for high skills does a good job of explaining these trends.

Many are concerned about the growth of inequality in the United States, but you suggest a more optimistic perspective in light of the growth of human capital and economic growth. Could you share that perspective?

**Murphy:** Sure. First, you have to think about the growth of inequality and where it's come from, and probably the easiest place to start is education and the return that people get on their education. Over the decade of the 1980s and continuing though the 1990s, we saw growth in the premium for going to college. This can be seen best by comparing the average amount earned by college graduates to the average amount earned by high school graduates. In the late 1970s, the ratio of the two averages was about 1.35, saying that college graduates earned on average about 35 percent more than high school graduates.

By the time we get to the late 1990s, that number is more like 1.7, meaning that by the late 1990s, the average college graduate earned 70 percent more than the average high school graduate. Thus, between the late '70s and the late '90s, the return to going to college roughly doubled. If you look at the return to going to graduate school compared to stopping after high school, that gap increased even more.

On the one hand, you could say, well, that means there's more inequality. College graduates used to earn more than high school graduates. Now the gap is even bigger than before. That's sort of the downside, and I think that's one of the first reactions people have.

The return to going to college ... is higher today than it's probably been in half a century. That's a good thing. ... If we look beyond education, we see an increase in the skill premium generally.

Of course, the other side of the equation is that the return to going to college—that is, the return on your investment, if you invest the time, money and effort to go to college—is higher today than it's probably been in half a century. That's a good thing. When we say we have a higher return on investment, whether you earn more on your stock market investment or on your college investment, we think that that's a good thing. It means there's greater opportunity out there for individuals and society as a whole to increase our incomes by increasing our investment in people, by investing more in their education.

If we look beyond education, we see an increase in the skill premium generally, the gap in wages between skilled workers and unskilled workers, whether highly skilled high school graduates compared to less-skilled high school graduates, or highly skilled college graduates compared to less-skilled college graduates, those differences have gone up as well. So the return to being more skilled today is higher than ever.

What can we do as individuals, and what can we do as a society? The answer is obvious: Invest more in skills, and doing so will provide benefits for individuals and for society as a whole. That's the opportunity that's become available.

**Region:** Can you elaborate on the benefits for society as a whole? Are there significant externalities?

**Murphy:** Well, I think there are some externalities associated with going to school. But I always think about it as the gains to society are the sum of the gains to individuals. So if as a country we expand our education levels—we get more people to go on to college, we get high school graduates better trained, we get college graduates better trained—the improvement we'll get out of that as a group is probably double what it would have been a couple of decades ago.

Education and training have always been priorities. They have always been important to an economy. They're more important today than ever. So it says if we're going to focus our policy, or focus our interests, on improving society, one of the major places we want to look is, what can we do to enhance our human capital investment? The natural reaction when returns to investment go up is, do more of it.

**Region:** If externalities aren't really the issue here, then it would seem there's no real market failure. That is, people would invest in their own education sufficiently to reap those individual gains. Why is there a role for government investment in education?

**Murphy:** I think the role for government policy comes from two things. First, government is already heavily involved in education, particularly elementary and secondary schools, and the fact that many students are poorly prepared is thus an issue for policy. Maybe the answer is less government, but something needs to be done. And second, there is an important issue in that children cannot fully contract with parents—Gary Becker and I wrote about

this in "The Family and the State"—and this creates a role for government funding, particularly for poor families.

## INEQUALITY AND SKILL-BIASED TECHNICAL CHANGE

**Region:** That leads me to a dozen other questions, but let me focus on one. There's a near consensus among economists about skill-biased technical change as a key source of inequality, but David Card and others have suggested that there are still some puzzles with the theory, such as the slowdown in wage inequality growth in the 1990s, or trends in gender and racial wage gaps.

Do you agree that there are puzzles, or have those puzzles been resolved?

**Murphy:** I think there are a few puzzles, but I don't think there are puzzles that really jump out at me as the main thing. What really jumps out at me is the congruence of many different things. It's the similarities and commonalities of the explanations that strike me much more than the remaining puzzles.

One of the things that we've known over time is that there have been technological changes and other changes that have favored more-skilled workers. That's not new; that's been going on for at least the entire 20th century. What happens over time is that technologies and the types of activities in the economy change; that raises demand for more-skilled workers, and the economy responds by creating more-skilled workers. In the early part of the 20th century, that was more and more people going on to high school and finishing high school, and then it became going on to college and finishing college. So there's been this process whereby the demand for skilled workers rises and the supply comes along with it, and that's been true for a century.

If you look over the last 30 years, the nature of that technological change has changed somewhat. In the 1970s and 1980s, we saw rising demand for what you might think of as the top half of the skill distribution relative to the bottom half. And we saw that as expanding inequality throughout the range of wages. As we moved into the 1990s and then into the 2000s, much more of the contrast in demand was happening at the very high end of the skill distribution, between workers in the top 20 percent and the bottom 80 percent, between people with graduate degrees and people with college degrees.

We've had this long-run process of growing demand for skilled workers, ... but its character has changed over time. It's become more and more concentrated at the top end of skill distribution.

So we've had this long-run process of growing demand for skilled workers, but the nature of that demand shift hasn't remained constant. I think that changing nature is what actually answers a lot of the questions that David Card, for example, poses. He's thinking about this sort of single dimension of change; viewed in that way there are questions. The change has always been in the same direction, but its character has changed over time. It's become more and more concentrated at the top end of skill distribution.

**Region:** As seen in some of the work that David Autor has done, for example.

**Murphy:** Yes, David Autor's work. Finis Welch and I have also done some work along those lines. And the story hangs together pretty well. You have to dig a little bit deeper than the very simple analysis, but you're not changing your ideas. The basic concept is, let's think of the world in terms of supply and demand, let's think about the major drivers of demand being changes in technology and changes in the types of activities, measured by either occupational choice or industrial composition. Those same basic concepts explain a lot of the data.

With racial differentials—for example, black/white differences in the United States—you realize that what's going on is very much tied up with skill differences. If you look at education, there are pretty big gaps that remain between African Americans and whites in terms of the average quality of schooling and the average years of schooling. So, as education becomes more important, that puts minorities at an increasing disadvantage.

The answer to that problem, of course, is doing something to improve the education system for disadvantaged groups. When we go back to the supply-and-demand analysis, that problem shows up once again. Because what have we seen since 1980? We've seen the premium from going on to college rise; we've seen the number of people going on to college rise. Predictably, right? The higher the returns, the more people are going to want to go.

Unfortunately, the success rate for people going on to college has not been that great. That's one of the big problems we have. Women have been more successful than men at increasing their rate of completion of college. Women now way outnumber men in terms of the fraction that finish. That reflects the fact that we have lots of people who are more poorly prepared to go on to college. They may try to go to college, but they're not going to be very successful at it.

That creates a problem, because as the demand for skilled workers rises, the

price of skilled workers goes up, and more people go on to college. The natural effect, of course, is that we increase the supply of skilled workers, which will counteract that rise in premium somewhat. But if people don't finish college, well, the premium rise isn't counteracted by rising supply.

## UNEMPLOYMENT AND LABOR MARKETS

**Region:** In 1997, you wrote with Robert Topel that "the unemployment rate has become progressively less informative about the state of the labor market," because of the rising number of American men who have dropped out of the labor force, stopped looking for work; "nonemployment" was your term.

Do you think that an employment/population ratio would be a more useful indicator of economic well-being, rather than the unemployment rate as currently defined?

**Murphy:** It's difficult to look at, for example, the very low unemployment rates we saw in the early 2000s and say that represented an economy in which everyone was working. Unemployment rates were at roughly the same level that they were in the late 1960s, but if you look at prime-age males, the fraction actually working who were, say, 30 to 40 years old was quite a bit lower in 2001 because there was a big increase in the number who were out of the labor force in that age category.

It wasn't a random selection of people who were out of the labor force. It was primarily low-skilled workers who had withdrawn from the labor market as two things happened. One, the opportunities in the labor market for low-skilled workers had deteriorated quite a bit with the rise in demand for skill and fall in demand for low-skilled workers; and second, other things like the growth in disability benefits had allowed some of those individuals to withdraw from the labor market. We saw mostly a demand shift that caused people to move out of the labor market at the low end.

Our traditional measures of unemployment are not the best. ... We should have something that would take into account the number of people out of the labor force. However, you want to do that age-adjusted.

What that meant was, from a pure labor market perspective, the unemployment rate really wasn't indicative of what the economy was like. Unemployment in an economic sense wasn't as low as unemployment in a measured sense.

I think that remains true today—our traditional measures of unemployment are not the best measures that we could have. We should have something that would take into account the number of people out of the labor force. However, you want to do that age-adjusted, because the number of people who are 65 years old who are out of the labor force does not provide a good barometer of the labor market. If anything, it's a reverse barometer. If over the next 10 years, because we've had a huge decline in retirement account values, a bunch of 65-plus-year-olds start working, we're not going to say, wow, what a robust labor market! Right? We have all these 70-year-olds out there working today! That would be a bad barometer.

But when lots of 30- and 40-year-old males are not working, there's something going on there. That's an indicator that labor market conditions are not very conducive to having them employed. So I think if you're going to go to a more employment-to-population ratio type of analysis, you definitely have to restrict the age range and maybe even weight it in various ways, and also allow for gender.

For example, when the number of women move into the labor market or drop out of the labor market, again, we don't typically think it has the same implication as when men shift in and out. So, I'd like to move in that direction. I'm not sure there's a simple statistic that summarizes the labor market well. It's not something you can just calculate blindly from the Current Population Survey and say, this is better than the current unemployment rate.

But I think if we worked at it, we could come up with something better, and I do think it is hard to compare unemployment rates over long periods of time. The unemployment rate in 2001 being close to what it was in 1967 didn't mean the labor market in 2001 looked like the one in '67.

Now, the unemployment rate is still probably a pretty good measure in comparing what does the labor market look like in 2009 versus what it looked like in 2006.

**Region:** Short-term.

**Murphy:** Short-term. The things that Bob Topel and I identified are long-term factors—like the demand for skill. Those factors operate on a decade basis, not on a year-to-year, month-to-month, quarter-to-quarter basis. So the unemployment rate is probably still a good short-run barometer, but it is not a very good medium-to-long-term barometer. I guess that's the way I would think about it.

## ADDICTION

**Region:** With Gary Becker, you developed a theory of "rational addiction." Could you give us a description of what

seems, on its surface, a very counterintuitive concept?

**Murphy:** OK. Let's take that rational addiction framework. I guess I'll tie together—and I think this is what's important really—the predictions of the theory along with the mechanics of the theory.

We laid out in our analysis how someone would behave who was a perfectly rational individual faced with the notion that if he starts, say, smoking cigarettes, that that will have an effect on his desire to smoke cigarettes in the future—that is, our perfectly rational individual realizes that smoking today raises his demand for smoking in the future. And he takes that into account in his decision-making.

He also takes account of the impact of smoking today on other things in the future, like his future health—smoking today means he's more likely to get lung cancer or cardiovascular disease.

That theory has some pretty simple implications. One is, if I learn today that smoking is going to harm me in the future, then I will smoke less—that is, people will respond to information about the future.

People will also respond to future prices. If they think cigarettes are going to be more expensive in the future, developing a taste for cigarettes is a more expensive habit, and they will have an incentive to avoid building up a smoking habit.

A major implication that we tried to test in the data was, do anticipated increases in the future price of cigarettes impact smoking today? And what we found when we went to the data was yes, there's a pretty strong pattern saying that anticipated future changes in the price of cigarettes actually show up as less smoking today.

Now, what's interesting is you can compare that with what we call a naïve or myopic model. In a myopic model, people don't look forward and, therefore, they only decide whether to smoke based on the current price of cigarettes.

You ever meet anybody who said, I quit [smoking] because I didn't enjoy it?

No, people say, I quit because I worried about my health, worried about my children, it costs too much. But very few people stop smoking because they don't enjoy it. And that tells you immediately that there's an element of rationality to their decision-making.

They don't care about the future price. And the data actually reject that simple myopic model in favor of the rational addiction framework.

So I think the empirical evidence that we found was consistent with the rational addiction model. It was that evidence that convinced us, more than anything, that we were on to something. We wrote down the theory because we wanted to understand, what does the theory have to say? We then took it to the data to say, well, do the data bear out this theory or do they bear out a more traditional theory, that addicts are somehow completely irrational? And we found that the data say, well, people seem to respond at least somewhat in the direction of being rational.

You don't want to overstate it though. Our data don't say people are completely rational. It looks like they're mostly rational is the way I would interpret our data.

**Region:** Bounded?

**Murphy:** Well, I don't know if it's the same as bounded rationality, but they take account of future prices but not quite as much as the theory would say they should. The myopic theory says there should be a zero. Let's say as a normalization, the rational addiction framework says you'd get a one; you actually kind of get a number like 0.7 or 0.75. So it's closer to the rational model than the myopic model, but it's not a 100 percent victory. It's a 75 percent victory for the rational model. So it comes out to be a useful model for understanding behavior, but not a perfect model.

Subsequently, others have gone out and modified the model and tried to make it consistent with bounded rationality and hyperbolic discounting and all kinds of other things, so I think there's been a lot of work that's built on our model, that tries to help explain that last 25 percent that we missed. But I take it as saying that, look, the model is a very useful model for thinking about the world.

And I don't think it's that surprising to people. One of the things that comes into people's minds when they smoke is, they think about the future, they think about should I really be smoking, it's bad for me. Most people who quit smoking don't quit smoking because they don't enjoy it. Right? There's nobody out there who said, you know, I quit smoking because I didn't enjoy smoking. You ever meet anybody who said, I quit because I didn't enjoy it?

No, people say, I quit because I worried about my health, worried about my children, it costs too much. But very few people stop smoking because they don't enjoy it. And that tells you immediately that there's an element of rationality to their decision-making. Maybe not as much as there should be, in some people's minds, but there's certainly an element of rationality in the smoker's mind.

If you ask people who don't smoke why they don't smoke, there's an ele-

ment of rationality too. They say, well, I don't want to smoke because I don't want to get addicted and I don't want the bad health consequences. So I don't find it surprising that a model that says that people look forward has some predictive power. I think a lot more people would smoke if they didn't worry about the future.

## HEALTH AND MEDICAL RESEARCH

**Region:** Your work with Robert Topel on the economics of health and medical research has provided real insight into the enormous value we place on curing disease and extending life spans. But at the same time, of course, there's a high level of public concern about rising health care expenditure.

Do you think those concerns are warranted?

**Murphy:** I do, I definitely think so. The first thing to realize is that the improvements in health and longevity that we've experienced historically have been tremendously valued. That is, if you think about the last 30 years or you think about the last 100 years, it appears that the growth in health and longevity is worth about as much to people as the growth in material wealth.

You can see that by sort of a simple question. I'm going to take you from the year 2009 back to 1909, and I'm going to give you a choice. You can take one thing with you on your trip: You can take either today's health and longevity, or today's wealth. That is, you can either have the added income that we got over those 100 years, or you can have the improvements in health and longevity. And the question is, which one would you take?

You'd be giving up 20-plus years of life expectancy going back to then, or you could give up the very substantial growth in real income we have seen over the last 100 years. Our analysis says, that's a horse race, that probably the health is worth more than the wealth,

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but it's close. And the same is true, roughly, over a 30-year period. That is, the improvements in health have been roughly equivalent to the improvements in material wealth over both the short and long term.

That means a lot. It says, when we think about traditional economic growth, we say, wow, what a wonderful world we live in! I'm so glad to live in 2009 instead of 1909. And if you're just thinking about the material wealth side, you've probably got about half of it. The other half of the gain is that you're healthier, you live a lot longer and you're subject to much less disease than you would have been a century ago.

That to me is a starting point. Now there's another side, which is that the cost of achieving that health has gone up as well. You didn't get all that extra health for nothing. If you look at the last 30 years or so, the gains in health and longevity have been about three times as big on average as the increases in expenditures, so the gains have increased faster than have expenditures. However, that doesn't mean that expenditure is unimportant. In particular, if you look going forward, it's a big deal.

So now I'd like to completely shift gears from the past to the future. And let's suppose that we make a discovery and from some date onward, we have a 10 percent lower death rate from cancer. We estimate that a discovery that reduced cancer death rates by 10 percent has a present value of about $5 trillion. That's a big number—it's less than half but more than a third of a year of GDP. That's a lot of value.

So now let's think about a program designed to try to capture that $5 trillion gain. Let's say we're going to propose a big National Institutes of Health budget increase to try to work on the new War on Cancer. Say we spent $100 billion on our new War on Cancer. $100 billion is a lot of research money. If you talk to people, they'd say, we can do a lot with $100 billion; there's a good chance we can achieve that 10 percent reduction in the cancer death rate.

You might be tempted to think, well, isn't this a no-brainer? I spend $100 billion, and even if my chance is one in 10 of being successful, I'm going to get $500 billion in expected value. So what a great return on your money, a five for one, even with a one in 10 chance.

But what's left out of that equation? What's left out is the cost of implementing whatever cancer treatments I discover. If it costs $10 trillion in present value to implement these new treatments that generate the $5 trillion gain in life expectancy, we've lost money. The discovery has negative value, not positive value. On the other hand, if it costs only $2 trillion, well, we will end up with a $3 trillion net gain.

In this calculation, what matters? Does the $100 billion invested by NIH matter? What would happen if I made that $200 billion? Or I made it $50 billion? The answer is it does not matter much. Even the probability of success does not matter too much.

What really does matter is the cost of treatment. If treatment costs are $10 trillion, the project has a negative net pres-

ent value even if the research is free. With $2 trillion in treatment costs, the net gain from success is $3 trillion, so that we would get a good return even if the probability of success was one in 30. So when you think about research, it's not the dollars you spend that matter—what matters is the cost of implementing the treatment that might be discovered. The downside to research is not failure, but unaffordable success.

I think the following message comes out of that exercise: Cost containment and health progress are complementary. That is, if we can control costs, that makes research a much more attractive option. That's the most important lesson I learned from doing this work.

When you go to Washington and talk to people at NIH, what are they excited about? They're excited about that $5 trillion number. They're excited that, boy, we could do something that could generate tremendous value for people. We can cure disease and lengthen lives, both of which make people much better off. The work that Bob and I did quantifies that number; it says it's huge, $5 trillion for that 10 percent reduction in cancer.

You walk across the street and talk to the guys who have to pay for it, and they're terrified that people are going to come up with more new medical treatments that they're somehow going to have to finance. So, to me the bottom line is those two people have to work together. That is, we have tremendous ability to create value for people. We also know that health expenditure is a very important part of the equation. What we need to do is focus our research on finding affordable treatments.

And if we can do that, we can put more money into health research knowing that we're going to end up creating net value for people—gains in longevity and health that exceed the cost of investment.

The question of should we have a bigger NIH budget is not a question of whether we would be wasting the money. The question is, what are we going to get out of it? If we're going to get affordable treatments, a bigger NIH budget sounds great. If we have no cost containment, it's a much more dicey equation. We need to work together on, one, cost containment, and two, increased and better research.

## INTELLECTUAL PROPERTY

**Region:** You've done research on various aspects of antitrust and Microsoft, and also broader issues of copyright protection and intellectual property. As you know, economists Michele Boldrin and David Levine have argued that patents and copyrights inhibit innovation rather than encourage it. What's your perspective?

**Murphy:** I think they're wrong. I have a paper that takes them on pretty directly. There are some technical elements to what they did in terms of why they got to the answer they did. It's some of the assumptions they make about the form of demand in those systems.

It is true that a market without patents is not a market without incentives. That is, even if you don't have patents, you're still going to have incentives because to the extent that people need an original to make copies, the person who creates the original can collect some of that derivative demand. I make the original, I sell it to you. How much do I sell it to you for? Both the value you place on using it and the value you place on making copies to sell to somebody else. That's the mechanism that they say means the value doesn't go away. And it's true. They're absolutely right. In a simple world like that, the original producer captures all of the market value created.

But there's a slight twist here. The producer collects the market value, which is based on the quantity sold times marginal value. There's consumer surplus out there that the producer doesn't collect. When you have copying, you lose control of supply, which can diminish and in some cases greatly diminish market value.

That turned out not to be a huge problem for Boldrin and Levine because

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demand is very elastic in their world and more supply means more revenue. They live in a world with elastic demand for output, which means that more supply means more revenue because the decline in price is smaller than the increase in quantity. So you make this thing and people copy it and the quantity goes up and up and up, and the revenue goes up along with the quantity.

In a world where that's not true, and demand at some point becomes relatively inelastic, revenues actually go down, and the producer is able to collect all those revenues upfront, but those revenues can get very low. If you think about a curve with quantity on the horizontal axis and revenue on the vertical axis, the amount of revenue you get as a function of quantity is like a hill. There's some optimal quantity that would maximize your revenue. And when you have too little quantity you get less revenue, and when you have too much quantity you get less revenue.

Now when I as the producer control supply, what do I do? I issue exactly the right amount of supply to put me right at the top of the hill, where I collect all the revenue. Now that's not a good thing because I'm restricting output, but it's a good thing because it gives me an incentive to produce. It's the usual trade-off between incentives to create and the efficiency of use.

Since I control supply, I produce at the profit-maximizing quantity. What happens when people can make copies? Well, I have to take account of the fact that, once I put it out in the market, supply is going to grow. If people can make copies, I have to start with less quantity than I want, knowing that we're going to go up the hill and down the other side.

What happens when people can make copies really fast, like they can with music? I have to start way to the left, and then we go really fast over the hill. So I spend all my time way to the left where I get almost no return and way to the right where I get almost no return. It's true that I spent some time near the top of the revenue hill, but not very much.

In a more realistic model, for small rates of copying, Boldrin and Levine are right. If people can copy slowly, it's true that I don't need property rights. The inability to make copies quickly allows me to collect most of what I'd be able to collect anyway. On the other hand, in a world in which people can make copies very rapidly, it breaks down and there's a major decline in incentives, and you need copyrights and property right protection (or a substitute mechanism) to maintain incentives in that case.

So their model is fine for certain things like economic theories and other things that disseminate slowly. People say the Pythagorean theorem is a public good; well, we spent many billions of dollars last year teaching people the Pythagorean theorem. Right? Transferring that thing isn't free. And the value of knowing the Pythagorean theorem isn't zero because it costs something to obtain it. On the other hand, with things like Internet file-sharing, the song gets out there and we dissipate a lot of that value very quickly. So I would say they're right in a very special case, but not in many of the most important cases.

## ECONOMIC GROWTH AND FERTILITY

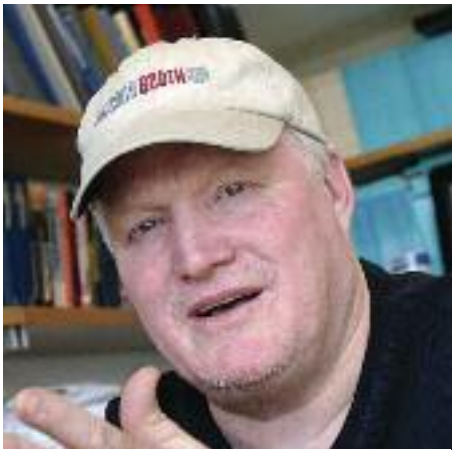
**Region:** One more question, if I could. In 1988, with Gary Becker and Robert Tamura, you wrote an influential paper on the relationship between human fertility, human capital and economic growth, suggesting that parents face a quantity/quality trade-off in deciding how many children to have—in the sense that they can better nurture the human capital of their kids if they have fewer of them—and further, that this increased human capital contributes to economic growth. It's a theme that Robert Lucas develops in his work.

What do you consider the most promising future directions for research on the mechanics of economic growth?

**Murphy:** There are two things I really want to work on more. One is a tighter marriage between work on economic growth and the work on investment in human capital. I think we need a better understanding of how investing in human capital, and changes in the cost of investing in human capital, feed into growth. So, I see a need for more on that element of it.

The second part that I think is really a fundamental question is fertility. We now know that more than 50 developed countries are below replacement fertility. In many places, we are far below replacement fertility. And the question is, where are we going on that? Is there a force out there, be it economic growth or the economics of the family, that's going to allow that to stay, or is there going to be a force that's going to push fertility back up? We have no really good macroeconomic theories of fertility in developed economies at the moment.

We have, for the early stages of development, the kind of Becker-Murphy-Tamura stuff that says what happens is when you start developing, you start getting human capital; as human capital goes up, the costs of children rise, the return on quality rises so you get fewer children, more investment in each child.



I don't think we understand anything about the determinants of fertility once we get to the modern advanced economy. ... And what's going on with human capital investment—particularly human capital investment in women? One thing we've seen worldwide is very rapid growth in human capital investment in women relative to men.

But I don't think we understand anything about the determinants of fertility once we get to the modern advanced economy. I think it's an incredibly interesting question, what's going to happen in a country like Japan, which is way below replacement fertility? What's going to happen in southern Europe? The United States has relatively high fertility, but still way below historical standards.

Gary Becker and I are currently working on those two prongs of the equation. What's going on with fertility? And what's going on with human capital investment—particularly human capital investment in women? One thing we've seen worldwide is very rapid growth in human capital investment in women relative to men. That is, the fraction of

women going on to college has increased faster than it has for men. That's true on a worldwide basis.

And to me that's a really interesting question: How do those fit together? What does that say about fertility? What does that say about women's involvement in the labor market? So my research agenda in this direction is to try to bring all those pieces together. The final piece of the puzzle, which is again related—what's interesting about this is it kind of brings all the research we've done together—is the realization that education is not just important in the market, but it's also important in the household.

Differences in, for example, longevity by education level, have been growing, and one of the reasons for that is that with the growth in the availability of various things you can do from a medical standpoint, there's more you can do to help yourself. More care has moved out of the hospital into the household. There's more outpatient care, there are more drug therapies, there's more patient monitoring of their own health. There's more knowledge of what's good to do diet-wise, exercise-wise. We know also that more-educated individuals are more successful at following those regimens than less-educated people.

So human capital is not only affecting how much you can earn in the marketplace, it's affecting how well you can run your life generally, and I think that's another part of the equation we want to bring in. We have this integrated program, thinking about fertility, and human capital in the household and in the market. That's sort of the picture we're working on right now. And hopefully Gary and I will be able to make some progress.

**Region:** Does Gary Becker ever stop working?

**Murphy:** No. He never stops working. He's a machine. He outworks everybody half his age.

## BUILT-IN FLAWS?

**Region:** I've heard that you're a great furniture-maker and that you build in or leave a flaw, a minor flaw, in each piece.

**Murphy:** I wouldn't say I am a great furniture-maker. Yeah, the flaw story is kind of true. I don't know about "a minor flaw." I like to make things that have some character to them, so I'll make a little curve here or there, or do something that's a little unique, 'cause otherwise it's so much like what you'd buy at the store. You know, you want to make it have some individuality to it, and that's the way I like it.

**Region:** Do you do the same in your models?

**Murphy:** I try not to. Those I try to make as good as I can. They end up with flaws anyway, but it's not by design.

**Region:** Thank you so much.

**Murphy:** And thank you very much. Good talking with you. R

*—Douglas Clement*
March 18, 2009

*For the full interview, including Murphy's thoughts on the implications of rational addiction theory for drug policy and the primary drivers of health care expenditure, visit minneapolisfed.org.*

## More About Kevin M. Murphy

### Current Positions

George J. Stigler Distinguished Service Professor of Economics, Department of Economics and Booth School of Business, University of Chicago, since 2005; with the University of Chicago since 1982

Faculty Research Associate, National Bureau of Economic Research

### Honors and Awards

Kenneth J. Arrow Award (with Robert H. Topel), 2007

Garfield Research Prize (with Robert H. Topel), 2005

MacArthur Foundation Fellow, 2005

American Academy of Arts and Sciences member, elected in 1998

John Bates Clark Medalist, 1997

Econometric Society Fellow, 1993

Sloan Foundation Fellowship, University of Chicago, 1989–91

Earhart Foundation Fellowship, University of Chicago, 1983–84

Friedman Fund Fellowship, University of Chicago, 1981–83

Phi Beta Kappa, University of California, Los Angeles, 1980–81

Earhart Foundation Fellowship, University of California, Los Angeles, 1980–81

### Publications

Co-author (with Gary S. Becker) of *Social Economics: Market Behavior in a Social Environment,* 2000

Co-editor (with Robert H. Topel) of *Measuring the Gains from Medical Research: An Economic Approach,* 2003

Author of many academic and mainstream press articles, with research focused on wage inequality, unemployment, economic growth and development, and the economic value of improvements in health and longevity

### Education

University of Chicago, Ph.D. in economics, 1986

University of California, Los Angeles, A.B. in economics, 1981