Published Quarterly by the Federal Reserve Bank of Minneapolis

September 2012

The Region

Volume 26 Number 3
September 2012
ISSN 1045-3369

The Region

The Region
Federal Reserve Bank of Minneapolis
P.O. Box 291
Minneapolis, MN 55480-0291

E-mail: letters@mpls.frb.org
Web: minneapolisfed.org

Cover Photograph by Peter Tenzer

Directors Tour the Bakken Oil Patch

Editors' note: The following are remarks by Mary Brainerd, chair of the board of directors of the Federal Reserve Bank of Minneapolis, and Narayana Kocherlakota, president, during a tour of the Bakken oil patch in North Dakota, Aug. 15-16.

Mary Brainerd

Mary Brainerd

Chair, Board of Directors
Federal Reserve Bank of Minneapolis

Good evening, everyone. My name is Mary Brainerd, and I would like to thank you all very much for being here this evening. I have the pleasure of standing before you in my capacity as the chair of the board of directors of the Federal Reserve Bank of Minneapolis. It's a treat to be here tonight, and rather unique for me and for the entire board of directors. As you've just heard, we're here to kick off a tour of the Bakken oil patch and to learn more about how the rapid development of the oil industry in recent years is reshaping the area's economy. And I have to say, after hearing so many stories about the Bakken, I can't wait to get a firsthand look.

I am going to take just a moment to tell you a bit more about my role on the board of directors, and also the role of my colleagues, and then I am going to introduce the president of the Federal Reserve Bank of Minneapolis, Narayana Kocherlakota. But first I want to add that in my day job, I am the president and CEO of HealthPartners, a Minneapolis-based nonprofit health care organization.

So, you may be wondering what a health services professional is doing on the board of directors of a regional Federal Reserve bank. I admit, when I was first informed that I was a candidate for the board, I had the same question myself. However, I soon realized that it made perfect sense. For example, I am joined on the board by a manufacturer of agricultural implements, a provider of social services, a leader in the development of water technology, and providers of financial services, to name just a few. Recent chairs of the board of directors have included a window manufacturer and representatives of labor organizations. Members of the bank's board of directors have represented every sector of the Ninth District's economy from the natural resources industry of Montana to the shipping industry of the Great Lakes, and everything in between, and from towns large and small.

So when you consider that one of the main roles of the Federal Reserve is to monitor economic conditions across the country, it does makes sense that people from diverse industries from the Upper Midwest should sit on the board of directors of a Federal Reserve bank. In addition, this expertise proves valuable to the board as we also provide oversight for bank operations; for example, I was privileged to be on the team that selected Narayana as president. As Narayana will describe in a moment, one of the great strengths of our regionalized central bank system is precisely that it requires such representative input. And I would add that it has been an honor and a privilege to serve on the board, and I'm sure all of my colleagues would agree, along with those in the room who have previously served on the board.

When you consider that one of the main roles of the Federal Reserve is to monitor economic conditions across the country, it does makes sense that people from diverse industries from the Upper Midwest should sit on the board of directors of a Federal Reserve bank.

I could go on about the role of the directors, and I would be happy to take any questions at the end of Narayana's remarks, but now I would like to introduce Narayana Kocherlakota, president of the Federal Reserve Bank of Minneapolis. His official biography is impressive: He is one of the top macroeconomists in the field today, and he has numerous journal publications to prove it. He has taught at Northwestern University, the University of Iowa, Stanford, and the University of Minnesota, where he served as chair of the economics department. He earned his Ph.D. in economics from the University of Chicago and his bachelor's in mathematics from Princeton. He became the 12th president of the Federal Reserve Bank of Minneapolis in 2009 at the ripe old age of 45.

However, as impressive as all of that is, one of the things that strikes me most about Narayana is his ability to take complex ideas or problems and explain them in such a way that, well, a health services professional can understand them. Maybe this is the teacher in him, but whatever the reason, we are lucky to have someone like Narayana at the helm of the Minneapolis Fed these days. With so much attention on the Federal Reserve and its role in the economy, we need a good communicator who is willing to take the time to explain and to interpret economic events.

You'll see what I mean in a moment. Ladies and gentlemen, please welcome Narayana Kocherlakota.

Narayana Kocherlakota

President
Federal Reserve Bank of Minneapolis

Thank you very much, Mary, for that introduction. And like Mary, I would also like to thank all of you for joining us here this evening as we begin our tour of the Bakken oil patch. This is my second visit in about a year. I was here last September for a similar tour and learned so much that I urged our entire board of directors to come out here too. They didn't need much urging: One of our directors, Howard Dahl from Fargo, whom many of you know, has been telling us so much about this land of milk and honey that it was easy to persuade the rest of the board that they should see it for themselves. Having had a good preview last year, I know that everyone will be impressed, and not only with the drilling sites and crew camps, but also with all of the truck traffic that we will encounter as we approach Williston. At one point during my last trip, I was attending a meeting in Sidney, Montana, and we were waiting for a speaker from Williston. He called to say that he would be late, because of traffic. Now, I haven't spent much time in western North Dakota, but my guess is that this is not something that I would have heard five years ago! More seriously—as we think about the tremendous economic returns that this area is experiencing, it's important for us to keep in mind too that there are certainly some costs associated with generating those returns. And I'm sure we'll hear more about those benefits and costs tomorrow.

So you've heard from Mary, and I've mentioned Howard. Let me begin by making quick introductions of the rest of the members of our board. As you listen to my intros, you might find it useful to keep in mind that the Minneapolis Federal Reserve district includes the states of Montana, North and South Dakota, Minnesota, and parts of Wisconsin and Michigan. Without further ado, then, here are the directors:

Mary Brainerd, president and CEO of HealthPartners, as you know, is our chair.

Randy Hogan, chairman and CEO of Pentair in Minneapolis, is our deputy chair.

From left to right: Jake Marvin, Jim Lyon, Howard Dahl, Julie Causey, Larry Simkins, Ken Palmer, Randy Hogan, Mary Brainerd, Dick Westra, MayKao Hang, Bill Shorma and Narayana Kocherlakota

And MayKao Hang is president and CEO of the Amherst H. Wilder Foundation in St. Paul.

Those three directors are what we call Class C directors, which means that they are appointed by the Board of Governors in Washington, D.C., to represent the public.
And then we have Howard Dahl, president and CEO of Amity Technology in Fargo.

Bill Shorma, president of Rush-Co/Strategic Rail Services in Springfield, South Dakota.

And Larry Simkins, chairman, president, and CEO of the Washington Companies in Missoula, Montana.

Those three are what's known as Class B directors. Like the Class C directors, Class B directors are representatives of the public. However, they are not chosen by the Board of Governors in Washington. Instead, they are elected by banks in the Minneapolis Federal Reserve district who are members of the Federal Reserve System.

And you've probably already guessed that our next group of three directors is termed Class A. These directors are elected by member banks in our district to represent those banks. And our Class A directors are:

Julie Causey, chair of Western Bank in St. Paul.
Ken Palmer, chairman, president, and CEO of Range Financial Corporation and Range Bank in Negaunee,

Michigan, which is in the Upper Peninsula. And, finally, Dick Westra, president and CEO of Dacotah Bank in Aberdeen, South Dakota.

Also present today is Jake Marvin, chairman and CEO of Marvin Windows, and our former board chair who served our board for six years ending last December.

I would like to publicly thank all of these people for their public service. Being a board director is a job that demands much and returns little beyond the fulfillment associated with important public service. And this event is a great illustration of what I'm talking about. Like all of you, these are busy people with important responsibilities back home, so for them to take time from their schedules to tour a region of our district speaks volumes about their commitment. I should also mention that we are joined by members of our bank senior management team as well as other bank staff today. While I won't take the time to introduce each of them, suffice it to say that this too is a group of highly dedicated public servants. They provide outstanding leadership and support to the Federal Reserve Bank of Minneapolis and the Federal Reserve System. I do want to particularly acknowledge Barb Pierce and Patti Lorenzen for their tremendous help in setting up the logistics for this visit. We are also quite fortunate to have two expert local tour guides for tomorrow: Loren Kospeng and Ron Ness. Before I go on, let me remind you that the following views are my own, and not necessarily those of others in the Federal Reserve.

As Mary described in her remarks, one of the strengths of the Federal Reserve System that Congress designed nearly 100 years ago, in 1913, is its system of regional banks and branches that ensures representation from citizens in towns and cities throughout the country, including relatively small communities like Springfield, Aberdeen and Negaunee. What I'm going to do in the remainder of my remarks is describe the decentralized nature of the Federal Reserve, especially as it pertains to monetary policy, and then discuss the role of the directors. After that, I will be happy to take your questions on these subjects or other issues on your mind this evening. In addition, as Mary noted, if you would like to direct a question to her about her role on the board of directors, she also stands ready.

Within the Federal Reserve we have clever ways of describing the work we do; for example, we use the highly technical term "three-legged stool" to describe our primary roles. Those three legs include payment services, supervision and regulation of financial institutions, and monetary policy.

So, to begin, the Federal Reserve Bank of Minneapolis is one of 12 regional Reserve banks that, along with the Board of Governors in Washington, D.C., make up the Federal Reserve System. Our bank represents the ninth of the 12 Federal Reserve districts, and, by area, we're the second largest. As I mentioned earlier, our district also includes the Dakotas, Minnesota, northwestern Wisconsin and the Upper Peninsula of Michigan.

What do we do at the Federal Reserve Bank? Well, within the Federal Reserve we have clever ways of describing the work we do; for example, we use the highly technical term "three-legged stool" to describe our primary roles. Those three legs include payment services, supervision and regulation of financial institutions, and monetary policy. Very briefly, that first leg means that the Federal Reserve Bank of Minneapolis, along with the other 11 Federal Reserve banks, works to ensure the smooth movement of funds between banks, savings and loans, and credit unions through a nationwide electronic payments system. As for the second leg, the Federal Reserve Bank of Minneapolis supports the Federal Reserve System in ensuring a safe, sound and accessible banking system, and stable financial markets through supervision and regulation of the nation's banking, financial and payments systems. This means that we implement rules and regulations as mandated by Congress. In doing so, we work with other federal and state agencies and regulators to promote safety and soundness in the operations of the financial services industry.

Obviously, I could spend a great deal of time speaking about those two responsibilities, especially supervision and regulation, which has grown in prominence since the financial crisis and the passage

of the Dodd-Frank Act. However, I want to move now to the third leg of the stool, monetary policy, as this role is the one that most directly impacts the lives of Americans and is also where the role of our directors is most prominent.

Monetary policy is established by the Federal Open Market Committee, or FOMC. The FOMC meets at least eight times per year and consists of the seven governors of the Federal Reserve Board in Washington, the president of the Federal Reserve Bank of New York, and a group of four other Reserve bank presidents that rotates annually. For example, I was on the FOMC in 2011 and will be a member of the Committee again in 2014. However, all 12 Reserve Bank presidents—whether they vote or not—participate in FOMC deliberations. This is an important point, as it highlights the decentralized nature of the Federal Reserve's policymaking. All of the presidents bring their perspectives on the economy to every meeting, and those perspectives are shaped, in part, by what we learn from our local districts. Our directors play a big role in that information-gathering process. At every board of directors meeting, a number of directors are charged with answering questions about trends in the economy. For example, are firms planning to hire? What are their capital expenditure projections? Are input prices changing? What are firms' expectations for growth in the near and medium term? Our directors don't just answer those questions from the perspective of their own companies; rather, they contact a number of businesses in their regions and industries to gauge broader business sentiment.

This type of information is very valuable to policymakers. As you might imagine, the Federal Reserve is very good at aggregating and analyzing data, but data often lag and do not give a complete description of what is currently happening in the economy. The information that I receive from our directors is important in helping me complete that economic picture. I should also note that the Federal Reserve Bank of Minneapolis has three advisory councils to seek further input from citizens in our district. These councils have members from the agricultural industry, small business and labor, and the financial services industry. As well, we have a branch office based in Helena (Mont.), and we receive valuable economic intelligence from the members of that branch's board of directors.

So I have described the Federal Reserve's decentralized structure, especially as it pertains to monetary policymaking, and I have also begun to explain the directors' role by illustrating how they contribute to that policymaking. Now I would like to briefly describe some of the other roles of the directors. Directors, as you would imagine, do more than just provide economic intelligence—in particular, they also provide oversight of bank management. In some respects, this is similar to any board of directors. For example, through committees and board deliberations, directors review and approve the bank's annual budget, review the bank's annual performance, and oversee the internal audit program and the bank's control environment. This oversight helps ensure that Federal Reserve banks are run as effectively and efficiently as possible. I know that I speak for all of our management team when I say that we benefit on an ongoing basis from the collective wisdom that gathers in our board room.

I began these remarks by introducing our board and describing the various classifications under which they serve. Those classes—A, B and C—may seem rather mundane, but they are really quite meaningful. Again, Congress had a good idea about how the Federal Reserve should be structured when it formed the System a century ago, and it has stood the test of time. That first group I mentioned, the Class C directors who serve to represent the public, are appointed by the Board of Governors in Washington, D.C. That last point is key because it ensures that the Board of Governors, which is appointed by the president and approved by the Senate, has a say in the makeup of our board of directors. So in that respect, our local board of directors has a direct connection to the federal government in Washington, which is important. The second group, the Class B directors, are also chosen to represent the public, but they are elected by member banks from each district. This too is important because it ensures that the public is represented by directors who are chosen locally, and not by Washington. In this way, the framers of the Federal Reserve Act carefully balanced national and local interests in the composition of bank boards of directors.

The last group, the Class A directors, who are elected by member banks to represent those banks, are the ones that have received some attention of

Narayana Kocherlakota, Mary Brainerd and Randy Hogan (vice chair of the board)

late. Since the financial crisis and the extraordinary measures that the Federal Reserve has taken to prevent the collapse of our financial system, some have questioned whether it is appropriate for bankers to sit on the boards of Federal Reserve banks. Isn't it wrong, these critics say, to give bankers power over those who are supposed to supervise them? It would be wrong if that were the case, but members of the board of directors—bankers or not—have no say in how Federal Reserve banks conduct their supervisory operations. Supervisory matters are handled directly between bank staff and the Board of Governors in Washington, D.C. Supervisory matters are not a part of the business of the board of directors.

However, what is a part of board business is the important information that bankers relate about credit conditions in the economy, about issues pertaining to the payments system and about general business conditions. This is precisely the kind of information that policymakers need to do their job, whether under extraordinary or normal economic conditions.

Our board of directors and our senior management team have made this trip out to western North Dakota to learn more about what makes your economy tick. But I'm glad, too, to have had this opportunity to tell you a little about our board of directors—a group of dedicated public servants whose role is often misunderstood by many. Now, I am sure that you have a number of questions. Mary and I look forward to doing our best in answering them. Thank you very much for your time. R

Janet Currie began her career as a labor economist, with important work on game and bargaining theory, arbitration and negotiation strategy, and wage and employment determination. Today, as director of Princeton University's Center for Health and Wellbeing, she explores the frontiers of genetic expression during fetal development, the impact of incentives on provision of health care and the effectiveness of the U.S. social safety net. Further, as director of the National Bureau of Economic Research's Program on Children, she encourages cutting-edge research on pollution from cook stoves in India, the impact of drought on education and the distributional effects of Head Start.

The core element of all of this work—the bridge that connects what seem quite disparate fields of economic research—is human capital. It's the idea—once controversial, but now undisputed—that humans possess skills, knowledge and abilities of enormous economic value. Some human capital is innate, but much is acquired through education, training and experience, as well as investment in physical and mental health. Understanding human capital, its many sources and the economic outcomes associated with its enhancement or degradation form a path that Currie has pursued for decades.

Currie is known for her keen insight, innovative technique and unwavering dedication to solid research. "The thing that characterizes Janet and her work is her fierce determination to get to the bottom of social problems—particularly those concerning children," observed economist David Card, a colleague and mentor. "She takes on Head Start, Medicaid or child nutrition, and works on it tirelessly over 15 years or more, using different data and methods to really understand what's going on."

Currie herself has no trouble explaining the coherence of her research agenda. "Labor economists think a lot about human capital and investments in it. Traditionally, that's something to do with education," she notes. "But I'm interested in health as human capital as well, and understanding how health and education intersect." And Currie is finding that interactions are complex and cross-generational. Maternal health affects child educational outcomes; education, in turn, influences parental and child health; and both have tremendous economic consequences. "It is a broad concept, human capital," she observes. "Not all these different boxes, but an integrated whole."

Janet Currie

Photographs by Peter Tenzer

FINANCIAL INCENTIVES AND MEDICAL PRACTICE

Region: I'd like to start with a few questions regarding your research on incentives and health care. Your 2008 *Quarterly Journal of Economics* study of tort reform and birth outcomes with your husband, Bentley MacLeod, and your 2011 paper together that broadened this "joint and several liability" research beyond childbirth procedures suggested that economic incentives play a crucial role in both the U.S. tort system and medical practice.

Could you tell us more about this work on the complex and sometimes conflicting financial incentives in health care and how it might relate (if at all) to your June 2012 NBER paper on physician-induced antibiotic use in China …

Currie: Yes, it's all very closely related, actually …

Region: And for that matter, perhaps also to your much earlier *American Economic Review* paper with Jonathan Gruber and Michael Fischer on physician payments, which found that increasing Medicaid/private fee ratios significantly decreased infant mortality rates.

Would you tell us more about this body of work?

Currie: Sure. Physician incentives are extremely important for the health care system, and everyone—or at least all health economists—thinks that financial incentives can distort people's decisions. But it's very hard to pin that down. There's a lot of literature on things like small area variations in use of medical care saying that utilization rates are much lower in Minnesota than they are in Florida, for instance, but people don't live longer in Florida, even though they get extra care.

Region: The Dartmouth research [online at dartmouthatlas.org/].

Currie: Yes. It's argued that these variations show there's waste or inappropriate utilization, but that's not a very direct way to go at it. The *QJE* piece on C-sections was looking at a specific argument about why doctors might be doing too much, which is that they're afraid of legal liability. It's very common for people to say doctors do too much because they're afraid of being sued if they don't. But there's a really obvious alternative hypothesis, which is that doctors do too much because the more they do, the more they get paid.

Region: Sure. Incentives work.

Currie: Yet no one ever says that, so in our paper, we look at how people respond to changes in the liability environment. One of the things we realized while we were doing it is that for something like childbirth, the doctor often doesn't really face any financial liability because if you have jurisdiction with Joint and Several Liability (JSL), people are going to go for the deep pocket. The deep pocket is not the doctor; the deep pocket is the hospital.

If you actually go and read these cases, sometimes they seem very strange. You have a C-section; something goes terribly wrong. And instead of talking about what went wrong in the surgery, they're spending all of their time saying, "Well, the nurse should have done this or that." The reason for that is that the nurse is an employee of the hospital, while the doctor is an independent contractor. So if you want to nail the hospital, the deep pocket, you have to show that the nurse was negligent.

The upshot of our study is that different types of tort reforms have quite different effects. We found that if you put caps on damages, you actually got more C-sections, not less. People found that counterintuitive because their belief was the reason the doctors are doing C-sections is to avoid liability.

Region: The conventional wisdom, right?

Currie: Yes, but on the other hand, if you're doing too many C-sections and causing surgical complications, then putting caps on damages makes you do more and not fewer.

JSL reforms, which had been largely neglected, are interesting from an economic standpoint because they get you away from this deep pockets regime to one where you're going to sue the hospital *and* the doctor. So it increases the doctor's legal liability if they do something wrong.

Region: So the new JSL regime apportions liability among concerned parties, not simply to the deepest pocket.

Currie: That's right. And it reduced C-sections. So our results point to the idea that the reason we have so many C-sections is that doctors make twice as much money doing them, which is the same thing we had found in an earlier study of Medicaid fees where we were looking at the differential [in payment] between doing a C-section or doing a normal delivery. When that differential increased, the rate of C-sections went up for the Medicaid people. So it's consistent with that.

In the more recent paper about JSL, we were trying to look more broadly at what happened to accident rates. We're looking at accidental deaths, and most accidental deaths are actually among the elderly. Many of them are trip-and-fall cases: Somebody leaves something lying around or doesn't fix the handrail, and an elderly person falls and dies. And again, we found that going away from the common law regime that encouraged going after deep pockets to a legal regime where everybody is responsible for the damage that they cause reduced accident rates.

Region: So there, too, the economic incentives mattered. And then there's the Chinese study—a totally different culture, a very different health care system.

Currie: Well, yes, but economists think that people are the same everywhere, right? In some fundamental sense.

In China, you don't go to the doctor, you go to the hospital. Everybody's treated on an outpatient basis. Also in China, hospitals are financed largely from drug sales. There's a very strong incentive to sell people drugs. Our study was an experimental audit where we sent people complaining of vague symptoms suggestive of mild colds or flu to clinics and then kept track of what medicines they were prescribed.

The results were really kind of hair-raising in the sense that none of the people we sent in should have gotten antibiotics, but I think 60 percent of them got antibiotic prescriptions. Most of them got more than one antibiotic prescription, and many of them were getting very sophisticated, expensive antibiotics that you're not supposed to use for trivial infections because they're supposed to be saved for more dangerous sorts of infections.

Region: And you had three or four variations in that study, with, for instance, patients offering gifts to the doctor or clearly stating that the doctor's recommendation would not influence what they would actually do.

Currie: Yes, in our initial study, our people [the "patients"] just presented with these symptoms, and the experimental treatment was that they would say, "I saw on the Internet that you shouldn't give antibiotics for a cough or cold." That simple intervention reduced antibiotic prescriptions by 20 percent. But other researchers said to us, "Well, that doesn't really establish why the doctors are prescribing the drugs. Maybe they're prescribing the drugs because they think that's what the patients want."

We wanted to get at *that* mechanism, and so in our second experiment, we had a number of different treatments. The results of the gift treatment were very striking. The person comes in and gives this really trivial gift. We have a picture of it. It's this funny pen with a little "Hello Kitty" or something on it. The "patient" also makes a little speech about how much they respect doctors, which perhaps is the real gift involved. In this experiment, the doctors who receive the pen are less likely to prescribe antibiotics, and they also spend a longer time with the patient and generally are more attentive. They do respond to that small gift. And so, we thought, that shows that the doctor doesn't think that the antibiotics are what the patient wants because if it was, then they would be responding to the gift by doing more of what the patient wants instead of less.

Region: It makes one think about the impact of far more significant gifts from the manufacturers, often through pharmaceutical reps.

Currie: Oh, yes, there's a huge literature on that. It's very interesting. If you Google "pen and pharmaceuticals" or "pen and doctor," you come up with all of this literature where people are arguing about whether physicians can be influenced by a trivial gift like a pen, which pharmaceutical companies give out all the time, along with little memo pads or things like that.

Region: Let alone funding medical conferences and the like.

Currie: That's right; everybody realizes that, yes, conference funding could influence people, and so that's bad. But there are lots of people who've written in very respected publications saying, "It's ridiculous to think that doctors' behavior could be influenced by these trivial things." I suppose the same people would say, "Oh, you can't learn anything from a study about these Chinese doctors because they're poor, or maybe a pen means more to them," or something. I don't think so. I think it's just human nature to want to reciprocate.

HEALTH INSURANCE AND HEALTH CARE

Region: With several colleagues, over a number of years, you've examined the impact of public health insurance, such as Medicaid, especially in the context of managed care, and the effect of expanding public health insurance on health care utilization and health status. You've also looked at the interaction between private and public provision of health care.

Two studies in particular caught my eye—your 2011 work with Douglas Almond and Emilia Simeonova of the expiration of Hill-Burton requirements in Florida and your 2007 piece with Anna Aizer and Enrico Moretti on Medicaid managed care in California.

What does this research, those two and the others you've done, tell us about the incentives, market structures and public institutions that are most conducive to provision of quality health care at a reasonable cost?

Currie: Yes, that's a good question. I think both of those papers show that providers are incredibly responsive to incentives and that they typically find the least costly way to deal with mandates. Maybe they also say something about unintended consequences of laws. The Hill-Burton study looked at this old law …

Region: Enacted in 1946.

Currie: Yes, but it went on for some period of time, and hospitals that got money under Hill-Burton were required for 20 years to devote 3 percent of their revenues to indigent care. We show in our study that the hospitals did do that: They were spending 3 percent of their revenues on indigent care. But the other thing—and this is consistent with some work that Mark Duggan did in California—was that we looked at who they choose to serve [Duggan, Mark. 2000. "Hospital Ownership and Public Medical Spending." *Quarterly Journal of Economics* 115 (November): 1343-74].

The hospitals seemed to have looked around and said, "OK, what class of patients are the best people to serve, given that we have to serve a bunch of indigent people?" And they picked pregnant women. Most pregnant women are

healthy. They typically have a short stay, so you don't have this huge right tail of expenses.

But they don't look around and say, "Oh, let's get elderly diabetics," right, who might have a huge right tail, or kidney dialysis people. So we were looking at what happened when these mandates expired. Many hospitals just closed their maternity units. They were like, "OK, we can get out of that business." In our data, we were able to follow the same women over time, and we saw women being shifted from one hospital to another either because the maternity service closed or because the hospital would no longer take Medicaid.

I think that's the most striking thing, is how rapidly the hospitals responded and how much they can change their service mix to try and attract the type of patients that are profitable. Also, it doesn't really make very much difference whether they're private hospitals or public hospitals or for profit or not.

Region: Yes, that surprised me a bit. You might expect different reactions from private versus public providers. And your 2007 study?

Currie: On Medicaid managed care. The whole argument about managed care is that if you have a patient and you have a capitated payment for that patient, then you should want to be providing preventive care to them so that you minimize your costs down the road.

I think the problem with that argument from the point of view of Medicaid is that there's so much churning of patients on and off Medicaid that the company looks at you and instead of saying, "I should provide you good preventive care," they say, "There's a good chance you'll be gone in a couple years and not my problem, so I want to give you as little as possible."

Added to that, in this particular case, was the fact that in California, they had carve-outs out of the managed care contracts. Carve-outs are things that don't have to be covered by the capitated payment. It turned out they had a carve-out for neonatal intensive care, which sounds fair on the face of it because neonatal intensive care is very expensive, and so maybe it is unfair to the plan to expect it to be covered by the one capitated payment if they happen to get a very sick infant. But that meant that Medicaid managed care plans had zero incentive to try to prevent very sick infants because if the infant was sick, the cost of care would go back to the state program.

IMPACT OF THE AFFORDABLE CARE ACT

Region: In this context, it was roughly a month ago that the Supreme Court issued its ruling on the Affordable Care Act. Given this ruling, what is your sense of the impact of the reform bill on health care in the United States, specifically child health?

Will this part of the "invisible safety net," as your book calls it, become more secure than it now is? Or does the decision's limit on federal powers over Medicaid expansion by states *mute* that effectiveness?

Currie: There are a bunch of different issues with respect to children. The original legislation focused on extending Medicaid to low-income, able-bodied adults. That mostly didn't affect children because poor children are already covered up to age 19, and in a lot of states, the children are covered up to 200 percent or even 300 percent of the poverty level. There might have been an indirect effect on children through the workings of the whole system in that if hospitals ended up being more stable or being more able to offer indigent care or something like that, then perhaps there would have been a spillover onto children.

The Supreme Court ruling could have several potential effects on children. One is that if states choose not to participate in the Medicaid expansion for adults, then hospitals are in big trouble. In the negotiations over this bill, hospitals agreed to give back money to Medicare on the understanding that there were going to be many more people who had health insurance, including Medicaid, so that the burden of providing indigent care would be reduced. Hospitals anticipated that they would do at least as well or better under the ACA than they had been doing before.

A number of states seem to be interpreting the ruling as saying that the federal government can't boss them around when it comes to Medicaid and they can change the provisions of the program however they like. … That would be really bad for kids. So the really scary part about the Supreme Court ruling is that it could have the effect of undoing a lot of the Medicaid expansions for infants and children that happened from the '80s basically through the middle of the '90s.

Now, with the ruling, in a big state like Texas, for example, if the hospitals are getting less for Medicare and they don't get the people coming in with health insurance, then they're in big trouble. Hospitals may have been not very profitable for a long time, so reducing their revenues further could have negative effects on the provision of indigent care or care to existing Medicaid patients, including children. So that's one way.

But then a more direct threat, I would say, to children is that a number of states seem to be interpreting the ruling as saying that the federal government can't boss them around when it comes to Medicaid and they can change the provisions of the program however they like. Maine has already thrown many thou-

sands of 19-year-olds off their Medicaid program. There was also a headline today saying that 14 states were restricting the services covered under the Medicaid program.

States have many things they have to cover, and then there are a bunch of things that are optional. States have always had the right to cut back on the optional things. But it may be that they're taking this Supreme Court ruling to mean that they can challenge the federal government's ability to mandate what must be covered. And if that's true, then you could have essentially a rollback in many states of the Medicaid coverage that children have. That would be really bad for kids. So the really scary part about the Supreme Court ruling is that it could have the effect of undoing a lot of the Medicaid expansions for infants and children that happened from the '80s basically through the middle of the '90s.

And my research suggests that would be really bad.

LABOR MARKETS IN U.S. HEALTH CARE

Region: I'd like to ask about your paper on hospital staffing and market structure in California, *Cut to the Bone?* Very intriguing work. Could you summarize that study briefly and tell us what bearing it might have for the future of labor markets in the U.S. health care industry?

Currie: We were looking at the big hospital chains. One of the things that have been going on in the hospital market is that big chains like Tenet or HCA have been taking over hospitals. We wanted to see how they reorganized the hospitals when they took them over. What we found was that they tended to change the way that the hospital was staffed.

Although there is a large literature arguing that there is monopsony in the market for nurses, we did not see any effect on nurse wages or employment levels when a hospital was taken over by a chain. But nurses were expected to work harder after the takeovers, in that they ended up with more patients per nurse. We couldn't, in that paper, show that there were direct effects on health, but it seems likely that there might be because many of the things that go wrong in hospitals have to do not really so much with doctors, but with the quality of the nursing care that people get.

Although there is a large literature arguing that there is monopsony in the market for nurses, we did not see any effect on nurse wages or employment levels when a hospital was taken over by a chain. But nurses were expected to work harder after the takeovers, in that they ended up with more patients per nurse. … The quality of the nurse labor force may fall over time if wages stay constant while the effort that is demanded rises.

Region: Do you have any sense of what impact, therefore, current consolidation trends in the United States might have on labor markets in health care? Of course, there's huge demand for nurses now, and there are many nursing strikes.

Currie: There is a high demand for nurses, but the quality of the nurse labor force may fall over time if wages stay constant while the effort that is demanded rises. Also, a lot of schools that used to train RNs in four-year programs no longer do that; the nurses are being trained in community colleges with two-year degrees. So you're getting a different sort of person doing it.

Region: Less human capital.

Currie: Exactly.

WOMEN IN ECONOMICS

Region: As you well know, women are underrepresented in economics, from undergraduate to professional levels. This is a broad question, but what are the impediments, trends and possible means of addressing this inequality?

Your research on mentoring is of particular interest here, of course. Your findings on the CeMENT program established by the Amercian Economic Association's Committee on the Status of Women in the Economics Profession (CSWEP) suggested that mentoring could indeed have an impact on professional development.

Have you or others been able to follow up on the results reported in 2010, which I believe covered CeMENT participants from 2004 to 2008, with a look at how those and the January 2010 cohort have fared?

Currie: One of the main impediments to women in economics is the same impediment for women in STEM [science, technology, engineering and mathematics] fields generally, and that is an underrepresentation in math historically. Now perhaps that's going to go away. I understand that for girls in high schools, test scores are now exceeding boys' test scores in math as well as in reading, whereas before it used to be the reverse.

So women have been catching up. But when they go to college, they still tend not to go into STEM fields and not to take mathematics. These days, if you don't have any math background, it's virtually hopeless to try to do an economics Ph.D. program. You can't even get off the starting block. I think that's one issue.

Another issue is the whole work/family thing. The problem there is more societal than it is with academic employers. There are problems with academic employers, and people think that universities could do more, but by and large, a university is an incredibly flexible workplace compared to most other

One of the main impediments to women in economics … is an underrepresentation in math historically. … Women have been catching up. But when they go to college, they still tend not to take mathematics. … Another issue is the whole work/family thing. … Personally, I found that the major challenges had to do with [my children's] schools. … The trends are, I think, slow—very slow—improvement over time.

workplaces. … Many departments really do kind of bend over backwards to help people manage their work/family issues.

Personally, I found that the major challenges had to do with [my children's] schools. Schools are always expecting you to show up in the middle of the day and on very short notice, which is odd given that they are largely staffed by working women themselves. They put pressure on mothers who are not able or willing to, say, show up with cupcakes on short notice.

And it's always the mom who is supposed to do that. If you're a dad and you do anything at the school, then you're a hero, whereas if you're a mom and you don't show up at least a couple of times a year, then you're just a bad mother. That kind of societal expectation is I think much more oppressive than most of what I experienced from my employers.

Region: And trends for women in economics?

Currie: Well, the trends are, I think, slow—very slow—improvement over time. It takes an awfully long time for people to go through graduate school and go through the hierarchy and become full professors somewhere.

Region: It's a long pipeline.

Currie: Yes, it is. I think role models are important too. I know some women don't believe that, but personally, you know, when [Harvard economist] Claudia Goldin visited when I was a graduate student, that was tremendously influential for me. I am not sure that Claudia herself believes in role models, but she was a tremendous role model for me. I think the lack of successful role models has been an issue, though that has certainly changed with, for example, the recent female Clark medalists, Susan Athey, Esther Duflo and Amy Finkelstein. [See the interviews with Goldin and Duflo in the September 2004 and December 2011 *Region*, respectively, online at minneapolisfed.org.]

Now, the mentoring aspect is interesting in part because it's such a small intervention. What we do in CeMENT is to bring young female academics together for a couple of days at the end of the AEA convention. Women who apply are first grouped according to field, and then we randomly assign them to be in the treatment or the control group. At the meeting, the women from each field who are in the treatment group meet with a senior mentor and a junior mentor. And they are supposed to submit a piece of work, which everybody in their group reads and discusses with them. Other sessions deal with work/life balance, the tenure process, grant writing, the publication process and other issues as well.

What we found in the initial evaluation was that there did seem to be a positive effect of being in the program in terms of publications and grants. Maybe you could say it was directly because of the intervention. You know, you bring a piece of work, people look at it and then you're more likely to get your piece of work published.

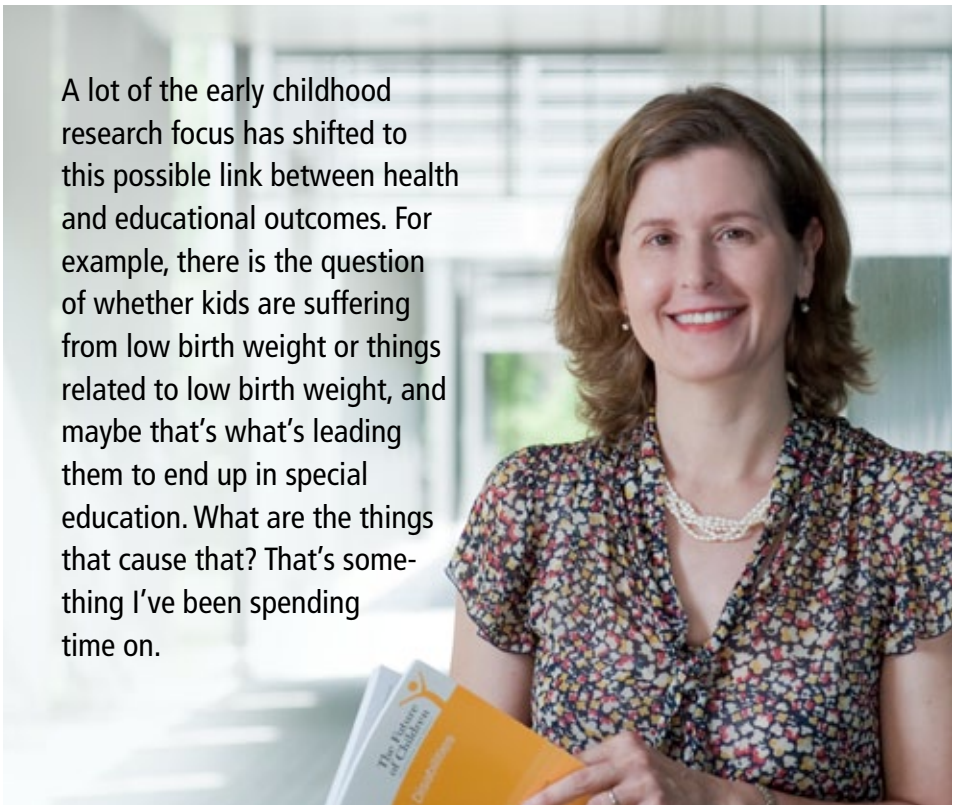
We are following up people over time. We don't survey them, but we look for their CVs online and see how they're doing. I guess I'll probably be doing that for the foreseeable future, trying to track down these cohorts every couple of years. Some of the anecdotal evidence was really very interesting about who benefits and why they benefited from it. Some women felt very isolated. They often had no other woman to talk to. If they felt they had problems that their male colleagues wouldn't understand …

Region: Cupcake expectations.

Currie: Yes, cupcakes. Then they would ask other members of their group about that. Also, when they graduate, some people are better connected than others, you know. One of the benefits of coming from an elite program is that you know people who also came from an elite program, so you tend to be better connected in the profession. If you don't have that advantage, you may not have any kind of group. We saw that people who were not as connected to begin with, or who had no women in their departments, seemed to rely on the group they were assigned to as a sort of peer group to discuss issues with and to get advice.

The mentors don't actually get contacted a whole lot, but they often do get contacted for advice about the really big things like, "I'm putting together my tenure package. Should I include this or that?" Or "What should I say when they ask me about letter writers?" So it seems like people gained access to an unbiased senior person who could help them when it really counted.

I don't know if it will ultimately play out in terms of a difference in tenure rates, for example, which is the hope, because it is a quite small intervention. But I think it has had some positive effects already.



EARLY CHILDHOOD EDUCATION

Region: As you know, the Minneapolis Fed has long been interested in the economic impact of early childhood education, and we were honored to have you participate in our 2003 conference. [See "The ABCs of Early Childhood Development" in the December 2003 *Region*, online at minneapolisfed.org.] At that time, you presented a paper on the "black box" of Head Start—what we knew at that time about what does and doesn't work in the Head Start program.

Your research suggested that more expensive programs were more effective in terms of gains in reading and vocabulary, and that spending should focus more on children and less on programs for parents and community development.

What have we learned since then about the impact of Head Start, specifically, and other ECE programs, more generally?

Currie: Well, one thing is that I was very happy to learn that my initial results seemed to hold up.

Region: Always reassuring.

Currie: There's a paper by David Deming, which uses the same research design as my early work on Head Start. [Deming, David. 2009. "Early Childhood Intervention and Life-Cycle Skill Development: Evidence from Head Start." *American Economic Journal: Applied Economics* 1 (July): 111-34. Online at people.fas.harvard.edu/~deming/papers/Deming_HeadStart.pdf.]

But in the NLSY [National Longitudinal Study of Youth] data you can now follow the children for much longer. He looks at outcomes when they're teenagers and finds generally positive effects. There's another paper by Pedro Carniero and Rita Ginja looking at Head Start using a somewhat different research strategy,

which finds positive effects on mental health outcomes. The focus on mental health in that paper is certainly an important new direction for research on early childhood. I have been surprised in my work on the longer-term effects of mental health problems in childhood by how big the effects are relative to the effects of physical health problems. [Carneiro, Pedro, and Rita Ginja. 2009. "Preventing Behavior Problems in Childhood and Adolescence: Evidence from Head Start." University College London. Online at ucl.ac.uk/~uctprcp/headstart.pdf.]

I think a lot of the early childhood research focus has shifted to this possible link between health and educational outcomes. For example, there is the question of whether kids are suffering from low birth weight or things related to low birth weight, and maybe that's what's leading them to end up in special education. What are the things that cause that? That's something I've been spending time on, trying to look at whether pollution or stress or other things during pregnancy might have an impact on health at birth, which would then lead to poorer educational outcomes.

FETAL ORIGINS OF INEQUALITY

Region: That certainly leads to your research on fetal origins, so perhaps we could talk about that. Since your work with Rosemary Hyson in 1999, if not earlier, you've been exploring the long-term relationship between health and economic outcomes.

In your 2011 Ely lecture to the AEA, you reviewed much of this research on determinants of health at birth and their link to adult outcomes, with new evidence about *in utero* exposure to pollution. And you shed further light on mechanisms underlying perpetuation of poverty.

Recently, you've explored the economic side of the fetal origins hypothesis. And you've been looking at early disease environments and their long-term effects on both mothers and children.

Economic studies are examining a wide range of things that might affect fetal health and asking whether they have long-term consequences … and I raised the idea of "epigenetic" changes as one possibility. … Epigenetics implies that it does not make sense to talk about nature versus nurture. If nature is the gene and nurture is the thing that sets the switches, then the outcome depends on both of those things.

Could you briefly review the fetal origins hypothesis and how economists have expanded its reach—to test scores, education and income as well as health?

Currie: I think the phrase itself was coined by David Barker, a physician who was interested in whether there was a biological mechanism such that if the fetus was starved *in utero* it would be more likely to be obese or more likely to have heart disease or diabetes, things related to that in later life. The idea is that you are sort of training the fetus to think this is a hungry environment so that they should be really thrifty with food. An infant programmed in this way would then be more likely to gain a lot of weight later on and to have diseases related to obesity. So that was specifically what the fetal origin hypothesis was about.

I believe Thalidomide was the first thing that really shocked people and showed that if you give drugs to the woman, that it could have an effect on the fetus. People were also working on the Dutch "Hunger Winter" prior to Barker, looking into whether being literally starved *in utero* had long-term effects.

So economists have taken that idea and run with it. Economic studies are examining a wide range of things that might affect fetal health and asking whether they have long-term consequences. I think there's pretty broad acceptance now of the idea that all kinds of things that happen when people are *in utero* seem to have a long-term effect.

One of the things I talked about in my Ely lecture was what mechanism might underlie the long term effects, and I raised the idea of "epigenetic" changes as one possibility. The way I like to think about that is you have the gene, which only changes very slowly when you have mutations. But then kind of on top of the gene you have the epigenome, which determines which parts of the gene are expressed. And that can change within one generation. There are animal experiments that do things like change the diet of guinea pigs and all the baby guinea pigs come out a different color. It can be pretty dramatic.

Region: So, far different, and far quicker, than natural selection.

Currie: Yes, it's a different mechanism, and it makes some sense from an evolutionary perspective because it's a way for populations to change rapidly when it's necessary. The idea is that the fetal period might be particularly important because these epigenetic switches are being set one way or another. And then once they're set, it's more difficult to change them later on.

I think we haven't really been able to look at all of the implications of that given the limitations of the data. We don't have very much data where we can follow people from, say, *in utero* to some later period. But, that's where the frontier is, trying to do that kind of research and make those linkages. What I've been able to do is to categorize a whole set of things that have systematic impacts on

the fetus. I'm really happy I didn't know any of these things when I was pregnant.

Region: How old are your kids?

Currie: My kids are 12 and 15, so I didn't learn about any of this until afterwards. I would have been a nervous wreck!

I think a really interesting thing about the fetal origins hypothesis for public policy is that if it's really important what happens to the fetus, and some people think that maybe the first trimester is the most important or the most vulnerable period, then you're talking about women who might not even know that they're pregnant. It really means you should be targeting a whole different population than, say, 15 years ago, when we thought, oh, we need to be targeting preschool kids instead of kids once they reach school age. Now we're kind of pushing it back. Then it was, "We need to be playing Mozart to infants." Now the implication is that we've got to reach these mothers before they even get pregnant if we really want to improve conditions.

Epigenetics implies that it does not make sense to talk about nature versus nurture. If nature is the gene and nurture is the thing that sets the switches, then the outcome depends on both of those things. So you can't really talk about nature or nurture in most situations. It has to be some combination of both.

Region: It just struck me that that contrasts a bit from your early childhood education finding that you don't want to focus program spending on mothers or parents. Focus on the kids, not on the moms.

Currie: That's true enough. I guess a cynical view would be, "Well, if they've already had their kids, then there's no point, right? Quit worrying about them." But many moms who have one young child are likely to have another, so maybe that would be a good way to target them. But in a different way than they get targeted now.

Things we're looking at here in the United States, like the effects of *in utero* exposure to pollution on child health and economic outcomes, involve problems that are much worse in developing countries. … If there are children in developing countries who are damaged from the start because of the conditions they're exposed to *in utero*, or in early childhood, then that would definitely be a drag on development.

THE NBER SUMMER INSTITUTE

Region: One more question, about your work as director of the NBER's Program on Families and Children. You've pulled together a number of papers that will be presented here in Cambridge tomorrow. What key themes are you hoping will be covered at that session? And therefore, what themes are you perhaps hoping to encourage in future economic research? I don't know if that's how you choose papers but …

Currie: Well, the way I choose papers is that people submit them, and we had an awful lot of papers submitted this time, and then we just pick the ones that seemed best.

But, indeed, some themes do seem to be emerging. One thing that is interesting—and I'm starting to do a little bit of work like this myself—is thinking about children in developing countries. Things we're looking at here in the United States, like the effects of *in utero* exposure to pollution on child health and economic outcomes, involve problems that are much worse in developing countries.

So if we can find an effect here … for instance, my E-ZPass paper suggested that the incidence of low birth weight was 8 percent higher for pregnant women who are subjected to large amounts of auto exhaust because they live near highway toll plazas. If that is true here, then what must be the effect in Beijing? It must be even bigger than that.

Region: Right, or other sorts of pollution that you've looked at: toxic releases or factory closings/openings, for instance.

Currie: Yes. So one thing I'm excited about is that people are starting to think about these issues in developing countries. I think it's really important in a sense that if there are children in developing countries who are damaged from the start because of the conditions they're exposed to *in utero*, or in early childhood, then that would definitely be a drag on development.

And conversely, another thing I was thinking about is that you can have this kind of perverse selection effect. Suppose conditions get better and children who would have died now survive; if those children are nevertheless unhealthy, then you could have mean health decline over the short term with development.

Region: The human capital and health care costs associated with that would be enormous.

Currie: Right. So I think these are really important issues in developing countries, and they're starting to be addressed. So, tomorrow, we have a number of papers looking at Indonesia, Colombia and India as well as one looking at the relationship between family size and children's education across a large number of developing countries.

Another of tomorrow's papers that's directly relevant to the discussion we have been having is by Bruce Meyer and Laura Wherry about Medicaid expansions to teenagers. As I was saying, there were Medicaid expansions in the '90s. Their study shows that black children who gained insurance coverage as pre-

teens has lower future mortality rates.

And there is more work on Head Start. Marianne Bitler, Thurston Domina and Hillary Hoynes are presenting a paper looking at distributional impacts of Head Start. Interestingly, they find larger effects for Hispanic children than other groups, which is something I had also found.

Region: It'll clearly be a very interesting program tomorrow. Thank you so much.

—Douglas Clement
July 25, 2012

More About Janet Currie

Current Positions

Henry Putnam Professor of Economics and Public Affairs, Princeton University, since 2011

Director, Center for Health and Wellbeing, Princeton University, since 2011

Director, Program on Families and Children, National Bureau of Economic Research, since 2002; Research Associate since 1995

Previous Positions

Sami Mnaymneh Professor of Economics, Columbia University, 2009-11; Economics Department Chair, 2006-09; Professor of Economics, 2006-11

Charles E. Davidson Professor of Economics, University of California at Los Angeles, 2005-06; Professor of Economics, 1996-2005; Associate Professor, 1993; Assistant Professor, 1988

Assistant Professor, Massachusetts Institute of Technology, 1991

Professional Affiliations

Editor, *Journal of Economic Literature,* since 2010; Associate Editor, *Journal of Population Economics*, since 2010; Associate Editor, *Journal of Public Economics,* since 2002; Member, Editorial Board, *Quarterly Journal of Economics*, since 1995

Senior Research Affiliate, National Poverty Center, Gerald R. Ford School of Public Policy, University of Michigan, since 2002

Member, Board on Children, Youth and Families, Institute of Medicine, since January 2012

Member, Advisory Committee on Labor and Income Statistics, Statistics Canada, since 2011

Chair, Committee on Disclosure for Working Papers, National Bureau of Economic Research, 2011

Member, Health Researcher of the Year Committee, Canadian Institutes of Health Research, 2011

Member, Advisory Panel, National Children's Study, 2001-11

Honors and Awards

Second Vice President, Society of Labor Economists, since May 2012; Fellow, elected 2006

Ely Lecturer, American Economic Association Meetings, January 2011

Vice President, American Economic Association, 2010; Past Chair and Member, Honors and Awards Committee and Meetings Program Committee

Fellow, Center for Health and Wellbeing, UCLA, 2009-10, 2003-04

Research Fellow, Institute for the Study of Labor (IZA), 2003-14

Fellow, Society of Labor Economics, elected May 2006

Fellow, Canadian Institute for Advanced Research, 1997-99

Fellow, UCLA Center for American Politics and Public Policy, 1994-95

Alfred P. Sloan Foundation Research Fellowship, 1993-95

Publications

Co-editor (with Robert Kahn) of *The Future of Children: Children with Disabilities* and author of *The Invisible Safety Net: Protecting the Nation's Poor Children and Families* and other books and articles focused on the health and well-being of children. Extensive research on early intervention programs, health insurance programs, environmental hazards and infant health, intergenerational transmission of health, education and economic status, medical practice and health care systems, and labor negotiations.

Education

Princeton University, Ph.D., economics, 1988

University of Toronto, M.A., economics, 1983

University of Toronto, B.A., economics, Lorne T. Morgan Gold Medal in Economics, 1982

New and Larger Costs of Monopoly and Tariffs

Careful examination of industries in transition finds that both monopoly and tariffs generate significant costs

James A. Schmitz, Jr.*
Federal Reserve Bank of Minneapolis

Introduction

In standard economic theory, monopoly leads to a welfare loss. This loss stems from a misallocation of resources *across* industries: Too few goods are produced by the monopolist; too many in other industries. Economic theory had long suggested that this welfare loss exacted high costs from the economy. But modern understanding took a turn when, in a landmark 1954 paper,[1] Arnold Harberger analyzed the quantitative significance of monopoly costs in the United States. Were these costs as high as conventional economic theory suggested? The clear but surprising answer that Harberger provided was no.

Harberger estimated that, contrary to his expectation and to standard theory, the costs of monopoly were quite trivial. "We come to the conclusion that monopoly misallocations entail a welfare loss of no more than a thirteenth of a per cent of the national income. Or, in present values, no more than about $1.40 per capita," he wrote. "I must confess that I was amazed at this result. ... Monopoly does not seem to affect aggregate welfare very seriously through its effect on resource allocation" (Harberger 1954, pp. 85, 86, 87).

Other economists extended Harberger's work to estimate costs associated with tariffs, and here, too, the costs were trivial. A consensus quickly developed that Harberger's conclusion was indeed valid.

Recently, a new literature has taken a different approach to understanding the costs of monopoly.

* The author thanks Tasso Adamopoulos, John Asker, Doug Clement, Tom Holmes, Pete Klenow, Sam Kortum, David Lagakos, Justin Pierce, Todd Schoellman and Arilton Teixeira. A more complete version of this policy paper is available online at minneapolisfed.org.

Economic Policy Papers *are based on policy-oriented research by Minneapolis Fed staff and consultants. The papers are an occasional series for a general audience. Views expressed are those of the authors, not necessarily of others in the Federal Reserve System.*

ABSTRACT

Fifty-eight years ago, Arnold Harberger estimated that the costs of monopoly, which resulted from misallocation of resources across industries, were trivial. Others showed that the same was true for tariffs. This research soon led to the consensus that monopoly costs are of little significance—a consensus that persists to this day.

This paper reports on a new literature that takes a different approach to the costs of monopoly. It examines the costs of monopoly and tariffs within industries. In particular, it examines the histories of industries in which a monopoly is destroyed (or tariffs greatly reduced) and the industry transitions quickly from monopoly to competition. If there are costs of monopoly and high tariffs within industries, it should be possible to see those costs whittled away as the monopoly is destroyed.

In contrast to the prevailing consensus, this new research has identified significant costs of monopoly. Monopoly (and high tariffs) is shown to significantly lower productivity within establishments. It also leads to misallocation within industries: Resources are transferred from high- to low-productivity establishments.

From these histories, a common theme (or theory) emerges as to why monopoly is costly. When a monopoly is created, "rents" are created. Conflict emerges among shareholders, managers and employees of the monopoly as they negotiate how to divide these rents. Mechanisms are set up to split the rents. These mechanisms are often means to reduce competition among members of the monopoly. Although the mechanisms divide rents, they also destroy them (by leading to low productivity and misallocation).

Illustration by Daniel Pelavin


Pelavin

Looking *within* industries, it examines the histories of industries in which a monopoly is destroyed and the industry transitions quickly from monopoly to competition, as well as the histories of industries that rapidly moved the opposite way, from competition to monopoly. If there are costs of monopoly, those costs should be whittled away as the monopoly is destroyed. Likewise, if an industry is monopolized, costs should be created. In both cases, costs should be apparent when comparing the industry before and after monopolization.

Several industries have been studied with this method, including transportation in the United States and U.S. manufacturing of sugar, iron ore and cement. The historical records of these disparate industries show that there are costs of monopoly and tariffs within industries. In these industries, this new literature has shown that monopoly led to, among other costs, the following:

1. *Low productivity* at each factory. That is, for any given amount of inputs, monopoly meant that less output was produced than under competition.

2. *Misallocation of resources between high- and low-productivity factories*. That is, monopoly led to resources (capital, labor, etc.) being transferred from productive factories to unproductive factories. Again, this misallocation occurs *within* an industry and is different from the misallocation that Harberger studied.

In sharp contrast to Harberger's finding, these studies show that the welfare costs associated with monopoly and tariffs are not small. The consequence of cases (1) and (2) above is that industry output could have been produced with fewer inputs. One way to measure the loss, then, is to calculate the value of the "wasted" inputs. The histories of these industries show that as monopoly was destroyed in each, productivity at each factory soared. Doubling of productivities in a few years was common. The value of the wasted inputs was as much as 20 percent to 30 percent of industry value added.

A common theme (or theory) emerges from the histories as to why monopoly led to these costs. When a monopoly is created, "rents" are created. (In this usage, "rent" is the difference between what a factor of production is *actually* paid and what it would *need* to be paid to remain in use; as such, it is a measure of that factor's monopoly power.) Conflict emerges among shareholders, managers and employees of the monopoly as they negotiate how to divide these rents among themselves—or, more colloquially, how to "split the spoils." Mechanisms are set up to split the rents. Although they divide rents, they also destroy them (by leading to low productivity and to misallocation).

As used in this paper, the term "monopoly" means more than the strict definition: an industry with a single producer. One industry mentioned later in the paper was a cartel for 40 years. Conflict over rents emerged between groups in the cartel, firms, workers and managers. In some industries, there were high tariffs (and other forms of protection). This high protection led to strong incentives among groups in the domestic industry to form monopolies. Firms attempted to collude, and workers formed industrywide unions (i.e., monopolies). So, the statement that "tariffs led to large welfare losses" means that tariffs led to incentives to form monopolies and then to actual monopolies, and these monopolies then led to large welfare losses.

A body of literature in the 1960s and 1970s argued that the costs of monopoly and tariffs were not trivial, saying (in essence) that there were costs within industries. This theoretical literature, and why it did little to dent the "Harberger consensus," is briefly reviewed in Minneapolis Fed Staff Report 468 (online at minneapolisfed.org), on which this policy paper is based. In this policy paper, I discuss historical studies that look at the collapse of monopoly. I describe how the monopolies emerged and how they were destroyed. Then I discuss the mechanisms that were used to split rents and why these mechanisms led to welfare losses.

Monopoly: Its Creation and Destruction

When a monopoly is created, the government often has a hand in the process. This is the case in most of the industries studied, to greater or lesser degrees. In U.S. sugar manufacturing, the government played a central role in creating monopoly. During the Great Depression, sugar manufacturers were permitted, indeed encouraged, by U.S. law to form a cartel.

PHOTOGRAPH BY MARC NORBERG

Jim Schmitz

Many U.S. cartels were created during the Depression (as part of the New Deal), but the New Deal sugar cartel survived much longer than most. For 40 years, from 1934 to 1974, the industry was repeatedly able to renew the U.S. laws that enabled it to operate as a cartel. Soaring world sugar prices in 1974 resulted in the cartel losing political support, and the laws permitting it to operate as a cartel were not renewed.

To describe the government's role in creating monopoly in the other industries, a useful approach is to first sketch a very simple model. Consider an industry where transportation costs are large relative to production costs. If the domestic price is initially set equal to the cost of domestic production, then domestic producers will have a strong incentive to push their price up to the sum of foreign production cost plus the cost of transportation (or tariff) involved in bringing the foreign product to domestic markets.

The incentive to do so is great in this "industry" because, by assumption, transport costs are large relative to production costs. A very large tariff will be an incentive to increase prices, just as a large transportation cost would.

If the transportation or tariff cost is large, assume that groups will make investments to form monopolies. Firms will attempt to collude, and workers to form strong unions. Some groups may succeed. If later on protection is cut, the incentives to make these investments will fall, and the monopolies will weaken (or disappear). This same logic applies if, rather than a transportation cost advantage, local firms have a production cost advantage.

This simple abstraction is a good representation of both the iron ore and cement manufacturing industries. In the early 1950s, U.S. producers had production cost advantages over foreign producers, and the industries received significant protection. Groups invested in creating monopolies. At various times, firms in these industries were charged with trying to collude. The U.S. government investigated the industries for antitrust violations. It is unnecessary to enter into the argument as to how effective collusion was; there is little doubt that very strong, industrywide unions emerged in these industries. Although antitrust laws in the United States made firm collusion difficult, building monopoly unions was easier. Collective bargaining laws enacted by the U.S. government allowed unions to organize all workers in an industry and not be bound by antitrust laws.

The monopolies in these industries—in particular, the strong monopoly unions—lasted for many decades in the post–World War II period. The monopoly unions were able to provide very high wages. For example, by the 1970s, cement workers were paid as much as U.S. autoworkers (who were the highest-paid manufacturing workers). The unions also had very stringent work rules (as described later on).

In the 1980s, the monopolies in these industries weakened or were dissolved. The union in the cement industry dissolved. In the iron ore industry, the union did not disappear, but lost much of its clout. For example, work rules became much less stringent, and plant managers had more control over how to structure plant operations.

Why the weakening of the monopolies in the 1980s? Foreign producers were now threatening to enter local markets. Brazil offered to sell iron ore in Chicago and Cleveland, the heart of the U.S. market, at half the local price. Firms around the world offered to sell cement on the West Coast and Gulf of Mexico at half the U.S. prices.

How could foreign firms offer to sell at such discounts? There are two proximate reasons. First, transportation costs greatly decreased (relative to production costs) in the postwar period. This, by itself, would have meant a weakened incentive for continued investment in keeping monopoly. But, second, the production cost advantage of U.S. producers decreased. This development was, of course, to be expected, as the whole purpose of creating strong unions was to increase wages (and hence costs). The monopolies also led to lower productivity, increasing costs further. But what was striking is that U.S. producers were at a production cost disadvantage.

An obvious question is: Why did the unions (and other groups discussed later on) push wages so high and lower productivity to the point where foreign producers could offer such steep discounts? At least three possibilities come to mind. First, the groups realized that wage demands and work rules would lead to the demise of monopoly, but that this strategy was the best. Second, the groups realized that wage demands and work rules would lead to the possibility of foreign entry, but they expected more government protection than they were able to receive. Many calls for protection were made, and some protection was given, but it was not enough. Third, perhaps the outcome (foreign entry) was not expected. Although I do not know which story best describes the events, the story itself is not important for the issue at hand. The main point is that there are significant costs of monopoly and tariffs.

Monopoly: Splitting the Spoils (and Destroying Them as Well)

During the period when monopolies in these industries were strong, groups set up mechanisms to split rents. Here I discuss some of the mechanisms used and how they led to the destruction of rents—in particular, to low productivity and misallocation. When monopoly was weakened in these industries, the mechanisms were abandoned, leading to large productivity gains in establishments and to resources being reallocated from low- to high-productivity producers.

One mechanism used to split rents was competition-reducing rules. Here I discuss two types that were used: *quotas* and *work rules*.

Quotas

In the U.S. sugar industry, the New Deal cartel included factory owners, factory workers, farmers, farm workers and others. As the cartel was established, each of these groups sought to secure (for themselves) as large a share of rents as possible. A major mechanism to split rents was quotas. In the cartel, firms were given quotas—the right to sell a certain amount of sugar each year.

Incumbent farmers also sought, and were successful in acquiring, quotas—the right to grow sugar beet crops on a given number of acres each year. Without these quotas for incumbent farmers, nothing stopped firms from moving the locations of their factories or even using different farmers in the same location. Just as firms in the cartel used firm quotas to limit competition, incumbent farmers wanted quotas to limit competition among themselves (and from other farmers). Without these quotas, there was no way to ensure that incumbent farmers would receive a share of the monopoly profits.

As is often the case, these quota rights (both those of the firms and those of the farmers) could not be sold. Although the allocation of quotas for acres in 1934 was "efficient," over time there was a change in the comparative advantage of locations in manufacturing sugar. Hence, there emerged a significant misallocation of resources between factories, with low-productivity factories producing too much sugar and high-productivity factories too little.

I can estimate the magnitude of the welfare loss due to these mechanisms to split rents (the quotas), that is, from the misallocation of resources within the industry. Recall the introduction to this paper, which mentioned that one way to measure welfare loss is to calculate the value of wasted inputs in producing industry output. The estimates indicate that the losses were roughly 20 percent to 30 percent of industry profits.

Work Rules

In the iron ore and cement industries, those who were in a position to gain from the large transportation costs into local markets, and the protection offered by tariffs, were the factory owners, factory workers and even the local governments (e.g., townships) where factories were located. What mechanisms were used to acquire rents? Local

townships placed significant taxes on the production of iron ore and cement. Workers formed very strong unions. Although claims of collusion within both industries have been made, these claims are harder to document than the taxes and union contracts that emerged in these industries.

A major mechanism to split rents was the work rules in union contracts. Among other things, work rules were a way to limit competition among workers. They were structured so that managers could not play workers off each other.

Union contracts split the tasks in plants into groups or categories. Workers were then assigned to one of these groups or categories, that is, given the right to complete tasks in that category. Only the workers in this group could complete the tasks assigned to the group. Very often these distinctions among workers were arbitrary in that a worker in a particular category was able, but not allowed, to complete tasks in many other categories.

These types of work rules dividing work among members of the union are most often called *job classification systems*. They are similar to the quotas discussed earlier. In particular, work rules are a way to limit competition between workers, just as quotas limited competition between farmers. They ensure that groups of workers receive a share of the monopoly profits. But they also destroy profit.

What is the quantitative significance of work rules? In the 1980s, when the work rules in the iron ore and cement industries were made much less stringent, labor productivity doubled in a few years. Other productivities increased as well. If these increases in productivity can be tied in large part to the relaxing of work rules, then obviously these are big welfare gains.

We can estimate the magnitude of this welfare loss due to these mechanisms to split rents (the work rules), that is, from the low productivity in establishments. Again, one way to measure the welfare loss is by the value of the wasted inputs. With these work rules, machines were down longer than necessary. The energy that was being consumed elsewhere in the plant when output was not produced was a wasted input. Capital was also wasted, as work rules meant that disabled machinery took longer to repair than was necessary.

Labor input was wasted as well. For example, a machine operator could not hold a tool for a repair person (who would need to bring in another repair person for such tasks). The value of this wasted input was the opportunity cost of the machine worker's time multiplied by the amount of time involved. A rough estimate suggests a dead-weight-loss-to-industry-value-added ratio of 16 percent to 17 percent. (See Staff Report 468, pp. 14-15, for details of this calculation.)

Using a dead-weight loss for the wasted capital and energy of a few percentage points (possibly more) of value added, together with the wasted labor estimate of 16 percent to 17 percent of value added, gives an estimate of over 20 percent in total.

Splitting the Spoils: Other Industries, Other Countries and a U.S. Cost Estimate

In other industries as well those just discussed, and in other countries, work rules have likely led to the same type of misallocation—with low-productivity plants producing too much output and high-productivity plants too little. However, I cannot be sure of their quantitative significance because no studies like those described in the preceding section have been completed for these industries.

Many U.S. industries had significant market power after World War II, first by virtue of the devastation that many countries faced as a result of the war and later because of government protection of U.S. manufacturing. Monopolies emerged; in particular, the postwar years saw the emergence of industrywide unions in the auto, steel, paper, tire, airplane and chemical industries, to name a few.

What mechanisms were used to split rents? The job classification systems discussed earlier are prevalent throughout manufacturing (though for the most part are less stringent today than a few decades ago). Some observers of these industries hold the view that work rules led to low productivity in plants.

Stringent work rules likely led to low productivity in establishments in many manufacturing industries. In some, they led to other types of distortions and losses not seen in the cement and iron ore industries. As I suggested earlier, work rules in these industries likely led to misallocation—resources being transferred from high- to low-productivity plants. High wages (and stringent work rules) have likely led to another type of misallocation in indus-

tries: a change of technology (in order to escape the wages and work rules).

A similar phenomenon—that is, monopolists splitting (and destroying) rents—occurs in other countries. In Britain, job classification systems (referred to as "job demarcation rules") are widespread. Demarcation rules are also used in France. In both countries, research suggests that these rules lead to reduced productivity.

I finish this section with a back-of-the-envelope estimate for the within-industry costs of monopoly and tariffs for the United States. This will enable a preliminary stab at the question, are these welfare losses similar in magnitude to Harberger's losses (0.1 percent of value added), or can I conclude that they may well be significantly larger?

Industries that are known to have strong unions and rigid work rules include mining, utilities, construction, transportation (in particular, airlines and railroads) and parts of manufacturing, in particular, durable manufacturing (steel, airplanes, autos). Assume that work rules had similar negative impacts on productivity in those industries as they did on the industries discussed in detail earlier—again, about 20 percent of industry value added.

Adding together the total value added of these industries thus affected (just over 25 percent of total gross domestic product in 1977) enables an estimate of welfare losses from monopolies and tariffs of roughly 5 percent of GDP (=20 percent loss of 25 percent GDP share). (Further calculation details are in Staff Report 468.) Again, this calculation is obviously extremely crude, but it does suggest that the losses may well be orders of magnitude larger than Harberger's estimated losses.

Costs of Monopoly: Summary and Observations

Research on the theoretical and quantitative significance of monopoly costs has evolved considerably since the mid-1950s, when Harberger's influential paper suggested—in contrast to the prevailing view among economists—that in the United States, the costs of monopoly resulting from resource misallocation across industries were actually quite insignificant.

This paper reviews a new stream of research that uses a different approach to analyzing the costs of monopoly. It examines the costs of monopoly and tariffs *within* industries rather than across them. In particular, it examines the histories of industries in which a monopoly is destroyed (or tariffs greatly reduced) and the industry transitions quickly from monopoly to competition.

Over considerable time spans and a wide range of industries, this research finds that monopoly exacts high costs in two ways: (1) through misallocation of economic resources between high- and low-productivity factories and (2) by decreased productivity at each factory. The historical studies call the Harberger consensus into question. At least in the industries studied thus far, monopoly and tariffs have led to significant welfare losses, on the order of 20 percent of value added.

A common thread runs through these histories, one that suggests a theory. When a monopoly is created, rents are generated. But the distribution of these rents—splitting the spoils—causes conflict among shareholders, managers and employees of the monopoly. These parties devise mechanisms to split the spoils, but the mechanisms often lead, paradoxically, to the destruction of rents.

The implications of this theory of monopoly costs, and of the empirical findings of high costs, deserve serious consideration by policymakers as they design and enforce antitrust measures. Government policies themselves, such as tariffs and other forms of protection, are an important source of monopoly. This review of recent research indicates that the costs of such protectionist policies are considerable and should be fully recognized and appreciated. Furthermore, policy reforms to minimize these costs should be carefully considered.

As for future economic research, a key question is to understand why mechanisms (such as work rules) are used to split rents when they also self-destructively wipe out rents. Why can't members of the monopoly structure contracts that avoid such large wasted resources? Differences in information? The inability of parties to commit to future actions? Such reasons may well be why mechanisms intended to split rents also destroy them. R

[1] Harberger, Arnold C. 1954. "Monopoly and Resource Allocation." *American Economic Review* 44(2): 77–87.

2011 Annual Report FEDERAL RESERVE BANK OF MINNEAPOLIS

Available at minneapolisfed.org

Research Digest

80 years on, the Great Depression defies economists' efforts to fully explain its causes, mechanisms and consequences. The Great Recession promises to be equally confounding. By the same token, both the Depression and the Recession unleashed streams of innovative research into largely neglected topics, thereby enriching economic understanding well beyond the crises themselves.

In this Research Digest, the *Region* reviews three examples of such work, recent studies by Minneapolis Fed economists and their colleagues on distinct aspects of the Great Recession. The first digest looks at international synchronization (or lack thereof) of economic cycles and the factors that may cause nations to climb or plummet in concert; the second explores interactions between financial frictions and firm-level volatility, and whether a model built around these phenomena might explain economic patterns seen in U.S. data between 2007 and 2009. And the third examines policy alternatives to pull an economy out of the doldrums when in the midst of what monetary economists refer to as a "liquidity trap"—when interest rates have reached the zero bound.

Fabrizio Perri

Financial integration and business cycle sync

Credit shocks are a key factor in explaining how global banking ties affect synchronization, and lack thereof, among national economies

Research Digest

It seems almost a tautology that global financial integration leads to international synchronization of business cycles. But economic research—both empirical and theoretical—has found the relationship to be far more nuanced. While many empirical studies have indeed found a positive relation between international financial linkage and cycle synchronization among countries, some recent research on developed nation ties has discovered that cross-border connections are actually associated with less synchronization when the years under study include few financial crises, such as the pre-2007 period.

Theoretical research to date is inconclusive in the sense that integration could lead to either divergence or convergence of cycles. Much depends on the *source* of the overall, or aggregate, fluctuations, suggests theory. If the negative shock is to a national *banking* sector and its efficiency, then problems in one country will likely spread to others, as global banks will also likely pull funds from unaffected countries. In other words, if Citibank Europe goes down, it's likely that operations of Citibank U.S. will be negatively affected.

But if the crisis is a negative shock to a specific nation's "real" economy (that is, a *non*financial sector), then that crisis could actually lead to a divergence in international growth, since banks will tend to pull credit from affected nations and send more of it to untroubled economies, where it's likely to provide higher returns. So, if Volkswagen is a customer of Citibank Europe and Volkswagen gets into trouble, then Citibank will devote more funds to U.S. firms, improving conditions in the United States.

The issue is quite relevant from the policy perspective. A better understanding of the mechanisms at work could clarify the potential impact on the United States of a euro-area meltdown or aid developing countries in understanding whether more financial integration with the rest of the world is desirable.

To bring greater clarity to the "ambiguous, and sometimes conflicting, answers" from the empirical and theoretical literature, Fabrizio Perri of the Minneapolis Fed, with economists Sebnem Kalemli-Ozcan and Elias Papaioannou, has written "Global Banks and Crisis Transmission," National Bureau of Economic Research Working Paper 18209, July 2012, and forthcoming in the *Journal of International Economics*.[1] Their paper takes on two tasks: It analyzes relevant data, and it then creates a model to help explain what the data reveal. In so doing, it tells a consistent and compelling story of the relationships between global financial integration, co-movement in business cycles and banking crises. The study is not the final word on these matters, of course, but it will undoubtedly lead future research in fruitful directions.

Key empirical findings

The economists begin by analyzing a unique database: quarterly data on country-pair bank links from 20 developed nations between 1978 and 2009. The three-decade period is one of international financial calm, by and large, punctuated by several financial crises, particularly that of 2007-09. A critical feature of the data set is that it provides information about *indirect* banking links as well as direct ties, thereby permitting measurement of the importance of financial exposure between countries through banks in offshore accounts in, for example, the Cayman Islands. Their statistical analysis—running regressions of relevant variables—reveals three central findings:

- When financial markets are calm, the association between banking links and business cycles is significantly negative—consistent with the study mentioned earlier.
- In periods of financial crisis, this negative correlation approaches zero. This suggests that "a financial crisis is an event that induces co-movement" among

Research Digest

countries that share financial links, thereby muting the usual negative association.

- During the 2007-09 financial crisis (though not in other crises in the period studied), there was a positive association between business cycle synchronization and exposure to the U.S. financial system. But curiously, *indirect* links through the Cayman Islands were a powerful explanatory factor in this financial contagion. "The positive correlation between output synchronization and financial linkages to the U.S. emerges only when, on top of direct links to the U.S., we also consider indirect links via the Cayman Islands, the main off-shore financial center of the U.S. economy."

These findings provide a logical bridge between two separate bodies of research on financial integration, one that looks at business cycles and another that focuses on financial contagion. Financial crises spread contagiously from one country to another through bank connections, it appears, and this creates greater business cycle co-movement among countries that are tightly connected financially. During the recent crisis, many observers believed that the U.S. credit shock spread internationally via bank networks, but empirical evidence for the idea was largely absent. That evidence now exists.

In part, the quality of the study's data set is what allows the economists to provide this elusive confirmation. Its depth and structure enable them to distinguish the effect of financial connections between individual country pairs from the impact of large shocks common to *all* nations. With its greater historical range, a better measure of financial integration and solid panel data, the researchers can isolate the specific importance of *bilateral* financial links.

A model with credit shocks

The second part of the paper is devoted to building a model of international business cycles with banking and then running it quantitatively, to see if, with reasonable parameters, it can generate patterns seen in actual data. The idea is to create a mathematical representation of the economic mechanisms that may be at work in an integrated financial world. If this model can faithfully replicate real-world results, then those mechanisms—and the theory behind them—may in fact be a reasonable explanation, during crisis and calm, of the impact of global banks on national economies.

The economists create an international business cycle model in which global banks allocate funds between, on one hand, households and others who save and, on the other hand, firms and other borrowers who invest those funds—the process referred to as "financial intermediation." In this model, both banking shocks and productivity shocks can cause economic fluctuations. As the economists write, the model serves two purposes: "to precisely spell a causal link between financial integration and business cycle synchronization" and "to show that our empirical findings can be used to identify sources of output fluctuations, and thus to shed light on the causes of the triggering and spreading of the 2007-2009 crisis."

They calibrate the model with standard real-world parameters for factors like depreciation rates and capital's share of output, but also for less standard variables like the degree of financial integration between pairs of countries, the costs incurred by banks in intermediating funds and banks' share of portfolios devoted to risky assets.

Testing: One, two, three …

With the model built, the economists see how it performs. First they show that when run with both banking shocks and productivity shocks, the model generates plausible business cycles and, indeed, helps explain some features that standard models (without credit shocks) have trouble with. Standard

Research Digest

Financial crises spread contagiously from one country to another through bank connections, it appears, and this creates greater business cycle co-movement among countries that are tightly connected financially.

models without credit shocks can't generate realistic values, for example, for changes in employment relative to gross domestic product or international correlations in consumption.

Then they give it the real test: checking its quantitative results against the empirical results from the first part of their paper. The primary test is to run the same regression equation on the model's artificial data as they ran earlier with the empirical (real-world) data. If roughly the same relationships appear in both, the model is a good fit and the mechanisms it contains hold explanatory power.

In specific, they compare results for synchronization of GDP growth among countries—business cycle co-movement. During tranquil times, the data show a synchronization coefficient ranging from -0.302 to -0.220. The model generates a coefficient of -0.35—the correct sign (negative) and a close numerical match. During crisis periods, the data's output coefficient ranged from 0.123 to 0.264. The model: 0.25—an excellent fit.

"The comparison between coefficients," they write, "suggests that the relation between financial integration and output co-movement implied by our model is statistically close to the one we estimate in the data." Both model and actual data indicate that when financial times are calm, greater bilateral financial integration leads to diverging business cycles, but when crises hit, this negative relationship is muted, as credit shocks transmit through international banking ties and business cycles synchronize more closely.

Lessons and future research

The model suggests that financial integration is a crucial determinant of synchronization of business cycles. When compared with the statistical relationship seen in real-world data, the model's estimates are quite close. "Although this does not formally prove that financial integration is indeed a causal driver of international business cycle integration," the economists observe, "it shows that this hypothesis is entirely consistent with the data patterns."

A second lesson from their model is that credit shocks are crucial in explaining the tendency for nations with close banking ties to contract simultaneously during crises. "This leads us quite naturally to conclude that indeed large credit shocks to financial intermediaries could have been the underlying source of the global contraction in economic activity that took place during the 2007-2009 global crisis."

The model also suggests an obvious direction for future research, say the economists: "The analysis of the effectiveness and desirability of policies geared toward reducing capital losses of the financial/banking sector, like the 2008 bailout." The model indicates that capital losses to banks strongly affect domestic and international economic output; in the future, policymakers might therefore consider measures to prevent or buffer such shocks, or to mitigate their transmission to the broader economy.

—Douglas Clement

[1] See "Not-So-Great Expectations," Region, December 2011, on related research by Perri, minneapolisfed.org/pubs/region/11-12/Research_Digest_Dec2011_Region.pdf.

Research Digest

Cristina Arellano (seated) and Yan Bai; Patrick Kehoe at right

"A promising parable"

Cristina Arellano, Patrick Kehoe and Yan Bai develop a model that convincingly generates macro patterns of the Great Recession

In "Financial Frictions and Fluctuations in Volatility," a Minneapolis Fed staff report published in July (SR466 online at minneapolisfed.org), economists Cristina Arellano and Patrick Kehoe of the Minneapolis Fed and Yan Bai of the University of Rochester develop a model that can convincingly generate several central macroeconomic patterns seen in U.S. data during the Great Recession. In particular, the economists explore the financial and microeconomic underpinnings of sharp declines in employment and economic output between 2007 and 2009, accompanied by relatively stable labor productivity. In almost all recessions, productivity and output *both* decline, but in the most recent downturn, *productivity was nearly unchanged*. What economic mechanisms account for this anomaly?

One clue that informs their investigation is the severe credit contraction during the recent U.S.

Research Digest

financial crisis. Another clue, at the micro level, is the large increase in dispersion of growth rates among firms—that is to say, growth at some companies suffered very little during the crisis, while other firms contracted dramatically. Even during normal times, companies grow at different rates, of course, but during the 2007-09 recession, the range between the highest and lowest growth rates nearly doubled.

These observations are building blocks for a quantitative model with heterogeneous firms (for which growth rates can differ) and financial frictions (meaning that credit markets don't function smoothly). The economists' goal is to create a model in which increasing volatility at the firm level leads to higher dispersion in firms' growth rates along with declines in both aggregate labor and economic output, but stable labor productivity. Their aim, in short, is to better understand the U.S. economy during the recent recession by building a model that can replicate its behavior between 2007 and 2009.

Central to the model: Risk, and firms hedging against it by trimming financial obligations wherever feasible—specifically, by hiring fewer inputs. "They key idea in the model," write the economists, "is that hiring inputs to produce output is a risky endeavor."

Firms receive revenue from selling their output only *after* they have already paid for inputs, such as employees, necessary to produce that output. Hiring labor (or buying materials or purchasing machinery) therefore entails risk, since demand for a firm's output may fall after the input expenditure is incurred. If financial markets were "complete," as economists say, firms could protect themselves against that event by borrowing against future profits; but in this model, financial market frictions mean that firms must bear the risk themselves.

"This risk has real consequences if, when firms cannot meet their financial obligations, they must experience a costly default," observe the economists. "In such an environment, an increase in uncertainty arising from an increase in the volatility of idiosyncratic shocks leads firms to pull back on their hiring of inputs." (Though the word "hiring" suggests employees only, here it applies to other inputs as well: raw materials, capital equipment and the like.)

If we build it, will it work?

The economists proceed in stages. First, they build a "benchmark" model. Then they calibrate and quantify it to gauge how well it matches real U.S. data. They create two alternatives to their benchmark model to pinpoint whether the results are driven by both factors (imperfect financial markets and volatility shocks) or just one. Lastly, they extend their model with refinements that bring it closer to how economists believe economies truly work.

The model has three key pieces:

(1) Firms hire inputs before knowing how much demand they'll experience for their output.

(2) Financial markets don't necessarily provide firms with credit, and they're especially averse when the economy is volatile; as a result, firms default if they're unable to pay their debts.

(3) Since firms pay a fixed cost to start their operations, they make positive profits in the future to cover those fixed costs; the cost of default is the loss of future expected profits.

These three essential parts mean that firms trade off expected risk and return whenever they choose their inputs. Hiring more inputs enables them to make more profit as long as they don't default. But because more hiring raises their financial obligations, it also increases the chance of defaulting. It's a tough choice, and becomes more so when the broader economy is looking uncertain—or, in the idiom of economics, "when the variance of idiosyncratic shocks increases."

Research Digest

The model includes identical households, heterogeneous firms and financial intermediaries. Households buy goods produced by firms, but the demand for each good is subject to idiosyncratic demand shocks. The volatility of these demand shocks varies over time, and this is the source of aggregate fluctuations in the model.

Firms are the guinea pigs in this model. They differ from one another, and they face not only volatile demand for their products, but imperfect or incomplete financial markets that don't allow them to insure against fluctuations in that demand. Thus, they may sink or swim based in large part on those fluctuations, as well as their hiring decisions. If they default on their debts, they fail: They "exit the market."

Benchmark and beyond

The benchmark model is calibrated to the U.S. economy with standard values for such variables as interest rates, annual sales growth for firms and the like. The economists test the model with these parameters by checking whether it can match U.S. data accurately; it does—with, for example, the fraction of labor employed by new firms at 1.8 in both data and model, and the liability-to-sales ratio at 5.5 in the data versus 5.6 from the model. A near-perfect fit.

Then they see how it responds to "impulses"—that is, how the model's mechanism reacts to a sudden increase in demand volatility. In this test, just as in the actual U.S. economy during the recent crisis, the model's output and labor (that is, employment) drop strongly when volatility increases, but labor productivity (defined as the ratio of gross domestic product to aggregate employment) increases slightly at first and then stabilizes. "The overall response," the economists write, referring to labor productivity, "is fairly flat compared to the responses of output and labor."

In addition, wages fall about 1.4 percent after the volatility shock and then continue a slow decline, and the interest rate drops just a bit initially and remains slightly depressed. The benchmark, in short, works well as a representation of the U.S. economy during the financial crisis, at least for one-time shocks in demand volatility.

They then build two alternate versions of the benchmark to investigate whether this success is due primarily to its inclusion of incomplete financial markets or to its volatility shocks. This investigation finds that "*both* financial frictions and the source of the shocks—volatility instead of productivity—are critical to our benchmark model's results" (emphasis added). In other words, neither financial frictions by themselves, nor just volatility shocks, are able to generate economic responses that resemble the real world during the Great Recession.

But the fundamental question is, how well can this model account not for a theoretical one-time volatility shock, but for a series of shocks like those experienced in the real economy during the Great Recession? The answer: very well. "We show that our model can account for much."

Real world testing

But the fundamental question is, how well can this model account not for a theoretical *one-time* volatility shock, but for a *series* of shocks like those experienced in the real economy during the Great Recession? The answer: very well. "We show that our model can account for much," the economists write.

To reach that conclusion, they first find the volatility shock sequence that generates dispersion among firms' sales growth rates similar to that actually measured in U.S. data between late 2007 and the third quarter of 2009. The data reveal nearly a doubling in this range of growth rates, from 17 percent to 31 percent. The economists feed that shock sequence into their

Research Digest

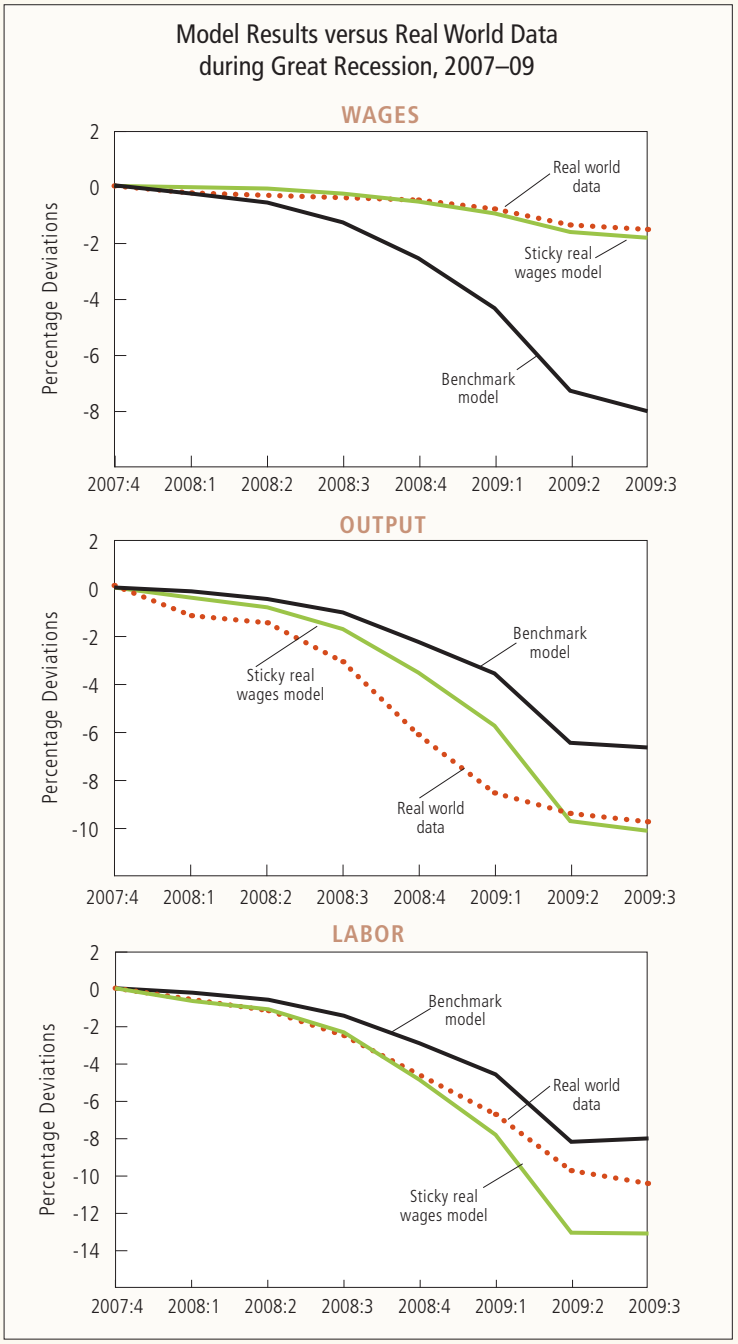
model and see what happens to macroeconomic output, labor and productivity.

Given how crude the model is—in the sense of leaving out countless aspects of an actual national economy—it does a remarkable job of generating results similar to real world figures. "The model generates a decline in output of 6.5 percent, whereas in the data output declines 9.7 percent," they find. And it "produces about an 8 percent decline in labor, whereas in the data labor declines about 10 percent."

While not dead on, the model's results are quite close, suggesting that the mechanisms at its heart are what drive the actual economy, through good times and bad. When the economists summarize the overall results, they conclude that the model "can explain 67 percent of the overall contraction of output and 73 percent of the contraction in labor during the Great Recession." The model produces a fairly flat productivity profile for the recession, while in real data, productivity first falls and then rises modestly. But "both in the model and in the data, productivity at the end of this event is essentially unchanged … even though output has fallen 10 percent."

Refinement

The economists explore several dimensions of, and refinements



Research Digest

to, their model. One is to alter the model by introducing "sticky wages," the idea that in the real world, most prices don't change instantly. A gallon of gasoline may rise or fall in price several times a day or week, but wages, automobiles and even items on a restaurant menu take a while to adjust to trends in the economy—to a broad recession or to a rise in the cost of health care, steel or eggs. This factors into the model, since in the benchmark version of the model, wages fall when volatility increases, and such response dampens the labor adjustment firms make.

And indeed, by making the model's input prices less responsive to volatility, the economists find that sticky prices "diminish offsetting equilibrium effects." The charts on page 35 show their results. They compare real wage trends in the data, the benchmark model and the sticky real wage model for the entire span of the Great Recession and show that while they drop by about 2 percent in the data and over 8 percent in the benchmark model, "in the sticky real wage economy, real wages drop about the same as in the data." Sticky real wages also amplify the output and employment effects of increased volatility.

Thus, Arellano, Bai and Kehoe's model, with key features and additional enhancements, does a striking job of duplicating patterns seen in the U.S. economy in recent years. "Hence," they conclude, "we think of the model as a promising parable for the Great Recession of 2007-2009."

—Douglas Clement

Research Digest

Juan Pablo Nicolini

Escape from the quagmire

An "unconventional" fiscal policy to spur the economy, with intentional inflation but minimal risk

In a liquidity trap, the nominal interest rate is at zero and can go no lower—it is at a limit referred to bleakly as the "zero bound." And this, precisely, is the current state of monetary affairs in the United States and much of Europe—one of the most pernicious outcomes of the Great Recession of 2007-09.

In the United States, where inflation remains low but unemployment stubbornly high, policymakers eagerly seek to boost economic activity. To that end, Congress and the Obama administration have wrestled over numerous expansionary fiscal policies. Several have been implemented, but with limited success.

The Fed, for its part, has nudged the fed funds rate toward zero—since December 2008 and counting—until it can go no further. The goal is to encourage business investing and consumer spending by minimizing the cost of borrowing.

Since hitting the zero bound, the Fed has tried nontraditional policy tools to stimulate the economy. The three major tools are the large-scale asset purchase programs, the maturity extension program and the Fed's new forward guidance policy.[1] All three are designed to bring down long-term interest rates and thereby stimulate household and business spending.

A better path?

The economics profession (let alone policymakers) has yet to reach a consensus—or concession—on the correct policy avenue to pursue.

A recent paper, "Unconventional Fiscal Policy at the Zero Bound" (Working Paper 698 online at minneapolisfed.org/research/wp/wp698.pdf), by Juan Pablo Nicolini of the Minneapolis Fed, with Isabel Correia, Emmanuel Farhi and Pedro Teles, proposes a novel fiscal strategy. The four economists lay out a series of fiscal policy measures that would relieve the zero bound faced

Research Digest

by monetary policymakers caught in the liquidity trap. It's this constraint, the impossibility of forcing nominal interest rates below zero, that undermines the Fed's standard policy intervention of lowering borrowing costs by injecting still more liquidity into credit markets.

The economists' fiscal policy proposal generates negative *real* interest rates that *will* stimulate investing and spending. And it will do so, the paper illustrates, effectively and efficiently—avoiding the harmful consequences of the more conventional fiscal policies advocated by some economists and the possibly long-term inflationary pressure that alternative monetary policy steps might create.

Creating inflation with taxes

It's a promising scenario, but as the economists acknowledge, their strategy of a tax policy that neutralizes the effects of the zero bound constraint is "unconventional." Explaining it requires careful technical description—it's a 50-page paper—but the central idea is fairly intuitive.

To encourage consumers and firms to engage in normal economic activity when the economy is stuck and nominal interest rates are at zero requires negative *real* interest rates. And "the only way to achieve negative real interest rates," note the economists, "is to generate inflation." (Recall Irving Fisher's eponymous equation: The nominal rate equals the real interest rate plus inflation.) This will make holding on to money costly; the longer cash sits in your wallet, your savings account or under your mattress, the less it will buy. Purchasing power will relentlessly dissipate. To avoid poverty, people will spend and businesses invest.

However, caution the economists, generating inflation for *producer* prices is inefficient; it would create economywide distortions that reallocate resources wastefully and result in lower economic output than would otherwise be possible. Instead, "the idea is to induce inflation in *consumer* prices while keeping producer price inflation at zero," they write (emphasis added). "The result is negative real interest rates, and yet the distortions associated with producer price inflation are altogether avoided. This can be achieved by simultaneously adjusting consumption and labor taxes."

The strategy, then, is to raise tax rates on consumption and lower them on labor. But what's critical is that these changes *continue over time*. So the consumption tax rise isn't just a one-time hike, but an enduring upward trend. (Indeed, one way to implement this would be to initially reduce consumption taxes and slowly bring them up; the key thing is that consumers face consumption costs that will be more expensive in the future than they are today.)

So, to reiterate, the hike and cut are ongoing: Rates climb over time on consumption and fall steadily on labor. The consumption tax, because it rises over time, effectively increases the price of purchasing something a year from now, making it advantageous to spend now—boosting economic activity.

Why cut labor taxes? Ongoing consumption tax hikes mean that workers have to put in more labor hours to pay for the constantly rising cost of products and services; that would alter labor decisions inefficiently. To prevent that distortion, labor tax rates must decline in mirror image to the rising consumption tax rates and, by effectively increasing take-home pay, balance out the increasing cost of consumer goods.

Changing consumption tax rates also distort investing decisions, generating temporary underinvestment in capital. To avoid this, a temporary investment tax credit or short-term capital income tax cut is also essential.

Reality check

The economists point out that others have raised similar ideas. In 2002, Harvard's Martin Feldstein suggested that to escape its own persistent liquidity trap, Japan could

Research Digest

To encourage consumers and firms to engage in normal economic activity when the economy is stuck and nominal interest rates are at zero requires negative real interest rates. And "the only way to achieve negative real interest rates," note the economists, "is to generate inflation."

raise its consumption tax rate and reduce income tax rates. In 2008, economists Robert Hall and Susan Woodford proposed sales tax holidays at the state level.[2]

Both proposals hinged on the same fulcrum: Future consumption taxes must be higher than current taxes. The Hall-Woodford sales tax holiday proposal, for instance, would lower the tax immediately to zero and commit to increase it in the future, thereby encouraging consumers to spend now and thus spur the economy.

But this research paper is the first with a model that formalizes the concept and includes the additional taxes necessary for its efficient implementation. The greater part of the paper is devoted to the model's mathematical structure and specification, and then its elaboration in alterative economic environments (when lump-sum taxes aren't possible, for example, or idiosyncratic shocks occur).

The economists go further, measuring outcomes under a variety of tax rate scenarios to see if the necessary tax rate changes would be reasonable in scale, not just a theoretician's pipe dream. And the plan does, indeed, seem practical.

To implement this plan under one feasible scenario, they calculate, tax rates on consumption that are 5 percent in the midst of the liquidity trap would increase over five quarters (15 months) to 14 percent. Simultaneously, labor income taxes would decline from 28 percent to 21 percent. A 9 percent investment subsidy would be implemented immediately and slowly unwind to zero.

Benefits and caveats

Such policies would yield substantial economic benefits relative to the stagnant status quo. Assuming prices and wages are somewhat rigid or "sticky," meaning that they don't change instantly, the unconventional fiscal policy would generate a 1 percent increase in consumption over 10 quarters and a 0.2 percent permanent increase. If some price or wage flexibility exists, increases would be greater still; flexible prices and rigid wages would result in increases of over 4 percent temporarily and nearly 1 percent permanently. In the world of economics, these are substantial gains, especially in the moribund landscape of a liquidity trap.

Other appealing features of this strategy: It's revenue neutral—though it alters tax rates, it requires no net tax increase to implement. And it's "time consistent"—an economist's way of saying that policymakers won't be tempted to change it later to achieve a better outcome.

In closing, the economists caution that this strategy does crucially hinge on the willingness to implement a policy of flexible taxes. But "after witnessing the policy response to the recent crisis in the United States and elsewhere," they observe, "it is hard to argue for lack of flexibility of any fiscal policy." Recent examples in the United Kingdom, the United States and Spain demonstrate that, faced with a recession that seems unending, policymakers will adopt promising policies—no matter how unconventional they may first appear.

—Douglas Clement

[1] For a more complete description, see remarks by Chairman Ben Bernanke, "Monetary Policy since the Onset of the Crisis," Aug. 31, 2012, at the Federal Reserve Bank of Kansas City Economic Symposium in Jackson Hole, Wyo., at

Research Digest

federalreserve.gov/newsevents/speech/bernanke20120831a.pdf. Also see the Board of Governors Maturity Extension Program and Reinvestment Policy page at federalreserve.gov/monetarypolicy/maturityextensionprogram.htm.

The Federal Open Market Committee provides forward guidance in its meeting statements. The Sept. 13, 2012, statement, for example, says, "To support continued progress toward maximum employment and price stability, the Committee expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the economic recovery strengthens. In particular, the Committee also decided today to keep the target range for the federal funds rate at 0 to 1/4 percent and currently anticipates that exceptionally low levels for the federal funds rate are likely to be warranted at least through mid-2015." Available at federalreserve.gov/newsevents/press/monetary/20120913a.htm.

[2] Minneapolis Fed President Narayana Kocherlakota discussed related ideas in a 2010 speech, based on work by Nicolini and his co-authors. Available at minneapolisfed.org/news_events/pres/kocherlakota_speech_11182010.pdf.

Virtual Fed

The price index is right

The Fed is intensely interested in accurately gauging prices and inflation. Along with maximum employment, price stability makes up half of the Fed's congressionally established "dual mandate." But it's not just the Fed that wants to know about such matters. The general public also has a lot at stake, and learning more about prices and inflation is an essential step in becoming financially literate.

The Federal Reserve Bank of Atlanta's Inflation Project is a one-stop shop for anyone who wants to know about price stability. Its most comprehensive tool is the inflation dashboard, which collects 30 data series that measure an array of prices as well as money and credit, condensing them into six broad indexes. The project also hosts the Atlanta Fed's own forward-looking survey of inflation expectations, along with a price index for goods whose prices are "sticky," that is, change infrequently. Finally, the site contains a market-based measure of the chances of deflation—when prices in general fall—which can happen during recessions and cause further economic damage.

Still seem overwhelming? A short video tutorial walks visitors through the site and makes it easy to use. Compare prices at frbatlanta.org/research/inflationproject/.

—Joe Mahon

2011–2012 Student Essay Contest Higher Education

Essay Question

What is the value of higher education?

This spring the Minneapolis Fed held its 24th Annual Student Essay Contest, which is open to all high school students in the Ninth Federal Reserve District. The contest drew 320 essays from schools throughout the district. The winning essay is published here. Other top essays can be found at minneapolisfed.org under the Student Resources section of the Community & Education tab.

Thirty finalists each received $100. The third-place winner received an additional $200, and the second-place winner an additional $300. The first-place winner, Matthew McFarland of the Blake School in Minneapolis, received an additional $400 and a paid summer internship at the Minneapolis Fed.

There are plenty of factors to weigh in making decisions about what to do after high school graduation. Family and social expectations are important, but the decision is fundamentally an economic one. Higher education is a major investment. How to weigh the costs and benefits is different for everyone, but the decision has tremendous significance for individuals and for society as a whole. Entrants in this year's essay contest were asked to evaluate such decisions using economic principles.

Student Essay Contest Winner

The Educated Democracy

Matthew McFarland
The Blake School
Minneapolis, Minnesota

In evaluating the beneficial externalities that justify government support for higher education, society must look beyond the economic benefits, such as increased productivity. Individuals who have invested in higher education develop stronger civic and communal values. Education strongly encourages political activity, public awareness, community involvement, personal and familial health, reduction in crime and acceptance of basic democratic values. These behaviors occur because investment in human capital increases the opportunity cost of inefficient time and resource allocation. Government investment in education is not only an investment in the economy; it is also an investment in the strength of the democracy itself.

The economics behind the higher rates of civic activity resulting from education can be explained by examining the costs and benefits of socialization. Glaeser, Ponzetto and Shleifer (2007) state, "A primary aim of education is socialization" (p. 79). Fundamentally, education imparts stronger communication and social interaction skills. An individual capable of effective communication increases his/her potential contributions to a group effort and the group's potential as a whole. As communication becomes easier, the cost of collaboration decreases. The opportunity cost of rejecting cooperation also increases with communication proficiency. The well educated spur their peers to participate in politics by using their developed persuasion/communication skills. Educated individuals are drawn toward collaboration because a group of efficient communicators is more effective than the sum of the individual parts (due to specialization). These individuals understand the necessity of cooperation to effect political change (see Glaeser, Ponzetto and Shleifer 2007).

The effects of education on democratic activity are clear. Dee (2003) states that college entrance correlates to an increase in voting by almost 30 percent above the average. He finds that education increases the rate of newspaper readership and significantly raises support for free speech. Glaeser, Ponzetto and Shleifer (2007) show that college graduates are overwhelmingly more likely to join groups and organizations. Dee (2003) and Glaeser, Ponzetto and Shleifer (2007) demonstrate that college graduates are more likely to "volunteer" to combat local problems (20 percent and 29 percent, respectively). Wolfe and Zuvekas (1995) state that, after income, education is the "primary determinant of donations" (p. 8) to charitable causes. Their research finds that college graduates dedicated twice as many hours toward volunteering as did high school graduates. Educated individuals pursue these civic behaviors because their stronger social interaction skills increase the benefits and decrease the costs of social interaction.

Beyond direct civic values, education reduces crime and promotes healthy lifestyle choices. A report issued in 2000 by the Joint Economic Committee of the U.S. Congress (Saxton 2000) states that the average crime rate in the top 15 "most educated" states was 20 percent lower than the same rate in the 15 "least educated" states. The report concludes, "Education has a greater effect on crime reduction than the higher income that is associated with superior educational attainment" (pp. 10-11). The high costs, both direct and indirect, accompanying the legal consequences of criminal activity discourage individuals with higher education from participating in illegal behaviors.

Wolfe and Zuvekas (1995) document additional

benefits of education. They indicate that education positively affects the individual's life expectancy and health. They propose that these health improvements arise from better information about nutrition, healthy activities and use of health services, along with a decline in health-harming activities. This claim is supported by their quantitative conclusion that additional years of schooling decrease the amount of cigarettes consumed, reduce the likelihood of heavy drinking and increase the average amount of exercise. Wolfe and Zuvekas (1995) also realize that children of more-educated parents tend to experience lower rates of infant mortality and low-weight births. Education helps individuals recognize the benefits of healthy behavior and the costs of unhealthy habits, positively affecting the health of the individuals and those closely associated with them.

Higher education, by increasing an individual's marginal productivity, raises the opportunity cost of nonoptimal choices. This higher cost induces individuals to make better choices, which generates beneficial externalities that are highly desirable in a democratic society. Higher education produces individuals who effectively cooperate to accomplish their political aims. These individuals are politically invested, active in their communities, charitably oriented, healthier and law-abiding. Utility-maximizing, educated individuals will avoid costly behavior while realizing the benefits of civic participation.

The presence of these beneficial externalities indicates that the free market alone will fail to produce the optimal supply of individuals with higher education. Government policy should aim to increase the number of educated individuals by reducing the costs of higher education through subsidies. The government currently subsidizes higher education through student loan programs and scholarship opportunities. Such subsidies are currently under attack for their "inefficiency." Before reducing funding for student loan programs, voters and policy officials must understand that cuts in funding will reduce the presence of the externalities brought about through higher education. Cutting subsidies could weaken the vitality of our democratic society. Before slashing these valuable aids, the "inefficiencies" of education subsidies must be weighed against the political virility, community health and civic values they bring about. R

References

Dee, Thomas S. 2003. "Are There Civic Returns to Education?" National Bureau of Economic Research Working Paper 9588.

Glaeser, Edward L., Giacomo A. M. Ponzetto and Andrei Shleifer. 2007. "Why Does Democracy Need Education?" *Journal of Economic Growth* 12 (2): 77-99.

Saxton, Jim. 2000. "Investment in Education: Private and Public Returns." Washington, D.C.: Joint Economic Committee, U.S. Congress.

Wolfe, Barbara, and Samuel Zuvekas. 1995. "Nonmarket Outcomes of Schooling." Institute for Research on Poverty Discussion Paper 1065-95.

The Region

Public Affairs
Federal Reserve Bank of Minneapolis
P.O. Box 291
Minneapolis, Minnesota 55480-0291

Presorted Standard
U.S. Postage
Paid
Permit No. 90100
Twin Cities, MN

CHANGE SERVICE REQUESTED

Incentives are extremely important for the health care system and can distort people's decisions. But it's very hard to pin that down.

—Janet Currie