

Neil Wallace thinks about money a lot. That might be true of all economists, of course, but Wallace is widely considered the father of money’s “microfoundations,” which is to say, its very essence—how families and firms conceive of and use it. Without that base, many believe, macroeconomic theory and policy stand on unsteady ground. But once solid micro-level fundamentals are established, predictions about the impact of change at macroeconomic levels can be made with greater certainty.

Wallace began working on monetary microfoundations in the early 1970s after reading a paper by former classmate Robert Lucas, an early proponent. The so-called Lucas critique, says Wallace in the following interview, “essentially broke down the barrier between microeconomic theory and macroeconomic theory.” Ever since, he has been building crucial monetary bridges from one to the other.

In his early years at the University of Minnesota, often in partnership with the Minneapolis Fed, Wallace collaborated frequently with Tom Sargent. They, with Chris Sims and Ed Prescott, were soon anointed the “Four Horsemen” of Minnesota economics and viewed as leaders of a new wave in economic theory. Prescott, Sargent and Sims recently won Nobel awards for research begun at Minnesota.

Wallace is far more modest about the value of his early work, pioneering though it was. “I learned all my serious economics very slowly at the University of Minnesota. And I’m *still* learning. I started at such a low base,” he jokes, “and I’ve been pretty lazy.”

Few agree with that assessment, of course, and the following conversation gives a glimpse of the range and insights of his prodigious research, from analyses of government guarantees and risk-taking to the impact of quantitative easing and why foreign currency markets are different from all others.



THE INFLUENCE OF LUCAS '72

Region: In the early 1970s, you were working with Tom Sargent at the University of Minnesota to build better models for deriving optimal policy rules under varying economic assumptions. And then you got an early draft of Bob Lucas' 1972 paper on rational expectations. Several years ago, you told me, "That paper cut away the underpinnings of what we'd been doing."

Wallace: Right.

Region: How did that paper influence your work? In what fundamental ways did it change your thinking about economics and macro models? And perhaps the course of your career since then.

Wallace: Bob Lucas and I had been fellow grad students at the University of Chicago, and we both took Milton Friedman's price theory course at the same time. This was two quarters of two, two-hour sessions a week, so it's a lot. And Friedman was well known for giving take-home exams, which were very open-ended questions—like, "This is a mystery; how do you think about it? How do you explain it?" Those were the exams.

Although this was microeconomics, called "price theory" at Chicago, he gave us a question about the Phillips curve, a negative association between inflation and unemployment. He had briefly talked about this in class, but the take-home exam question was basically, "How does this correlation come about?" I have no recollection of what I wrote.

Region: This was the early '60s?

Wallace: This was the winter of 1961. Bob Lucas was in this class, as I said, so maybe this was the start of his eight, nine, 10 years of work on this question. Now, in the early 1970s, Tom and I were working together under the general auspices of John Kareken, who was economic adviser to the president of the Minneapolis

Fed at that time. We were engaged in a number of projects to try to, you might say, bring some sort of rigor into the making of monetary policy.

John's vision involved building a model of the macroeconomy that would be useful to policymakers. Well, the Phillips curve and how to build a relationship in a model to account for it, and then to say whether this relationship is exploitable or not through policy—that was clearly at the heart of any such model. Tom and I were working on it, and doing nothing very different from what was standard at the time.

And then I came across this working paper by Bob Lucas.

And had I not known Lucas from having been a classmate, I probably wouldn't have read the paper. But knowing him and having a high opinion of him, I did try to read the paper. Although it was a pretty hard paper, I could quickly see what the main message was, and I realized that it undercut what we were doing and that we ought to reorient our research endeavor in a major way.

Region: It was that convincing to you at that point?

Wallace: Yes, it was. Because I kind of believe that some of the best economics consists of counterexamples. People think A is true, and someone builds a little model whose ingredients don't seem particularly weird and it implies not A. And so you've got to confront that.

Region: These are theoretical counterexamples, not necessarily empirical?

Wallace: Well, for me, yes, and certainly that paper was a theoretical counterexample. And people had varying reactions to it, but Tom and I bought into it. And, in part, we bought into it because macroeconomics at the time was emerging from what we call static models. Such models take conditions at a date and try to sort of figure out what is going to happen at that date and then, based on that,

That Lucas paper, "Expectations and the Neutrality of Money," had a major impact on our work. Even aside from its very important role as a counterexample to thinking of a Phillips curve correlation as invariant to policy interventions and, therefore, exploitable, it changed the standards for how we do macroeconomics. It said you've got to think about the economies of dynamic systems. It also essentially broke down the barrier between microeconomic theory and macroeconomic theory.

move on to the next date. But it was really just solving the model one date at a time.

That's what Keynes did, and almost everything up until that time, pretty much everything that grew out of Keynes' general theory, was like that. And yet, all macroeconomic phenomena inherently involved many dates. For instance, people are making decisions about how much to save and consume. Well, if they're saving, it's for the future, so they obviously have to be thinking about the future.

Tom and I had been struggling with how to put these notions about the future into models. Tom had already done some of this in his Ph.D. dissertation at Harvard several years earlier, but we were struggling with trying to do this kind of thing in complete economy models. At the time, my mathematical tools weren't good enough to do this.

Region: But as you and Tom developed the math, how did it focus your future research?

Wallace: Well, that Lucas paper, “Expectations and the Neutrality of Money,”—which, by the way, I’ve heard Lucas say at a conference, speaking publicly, that he regards as having been a waste of his time—had a major impact on our work.

Even aside from its very important role as a counterexample to thinking of a Phillips curve correlation as invariant to policy interventions and, therefore, exploitable for policy, that paper did other things.

It changed the standards for how we do macroeconomics. It not only said you’ve got to think about the economies of dynamic systems and solve for the whole path of outcomes, not thinking about solving it just one date at a time, but it also essentially broke down the barrier between microeconomic theory and macroeconomic theory.

Region: Which is why establishing microfoundations became crucial.

Wallace: Yes, right. Now, the idea of establishing microfoundations for macroeconomics had been in the air for a long, long time. But people were often doing it—and you still see some of this in what I think of as bad textbooks—by taking the equations that come out of Keynesian economics and trying to tell stories about those equations, one equation at a time. But those separate stories don’t add up to a coherent view of an economy.

Lucas became convinced that to build a model in which agents have a reasonable view about what’s going on in the world, you have to start with a coherent underlying view of an entire economy. Microeconomics had been doing that for a long time. I think Bob’s paper influenced many people in the direction of thinking we have to do that in macroeconomics as well.

EXISTENCE OF MONEY

Region: Let me ask you about money. Ordinary people don’t question its existence. It simply is. And it’s very useful

to have. But economists are not satisfied with that easy acceptance and have developed a number of theories about its existence and utility, as a measure of value, medium of exchange and so on.

As a monetary theorist, you’ve studied money far more deeply than most. Many economists consider you the intellectual father of money’s microfoundations.

When you introduce this topic to students, how do you discuss the issues involved? Maybe it makes sense here to quote from your 2008 discussion of fiat money in *Palgrave*, where you wrote, “Money is helpful when there are absence-of-double-coincidence difficulties that cannot be easily overcome with credit; and a good money has desirable physical properties—recognizability, portability and divisibility.” [See Wallace 2008.]

I don’t know if that’s a good starting point, but ...

Wallace: It’s a reasonable starting point. Every few years I’ve ended up writing something about how we should think about money, and that paper was one such piece.

Region: So, how do you introduce these issues if you’re sitting down with undergrads who, like most of us, simply take money, literally, at face value?

Wallace: Well, one of the things I say is, just because a thing is around doesn’t mean we understand it. Cancer is around. Does that mean we don’t want to do research on it? And then I talk a little bit about the history of thought on this absence-of-double-coincidence notion.

Region: In a word or two, what is the absence of double coincidence?

Wallace: A professor at Texas A&M put me onto a 1923 book called *Monetary Theory Before Adam Smith*. It was a Harvard Ph.D. dissertation on the history of thought concerning money. And its author, Arthur Eli Monroe, asks, did

When two people meet, it’s often the case that one has something that the other person wants, but not vice versa. And without money, nothing can happen. Trade will not occur. Now, this story is incomplete.

Aristotle have this absence-of-double-coincidence notion? Probably not. But he finds someone named Paulus, a Roman jurist in the second or third century A.D., who said something like, when two people meet, it’s often the case that one has something that the other person wants, but not vice versa. And without money, nothing can happen.

Region: Trade will not occur.

Wallace: Trade will not occur.

Region: So there’s one coincidence, not two? In this example, at least, one guy wants what the other’s got, but not vice versa.

Wallace: Right. Yes. My [University of Minnesota] colleague Leo Hurwicz always objected to the “double coincidence” terminology, even though it’s commonplace. He said the word “coincidence” itself means two. So “double coincidence,” he would say, is a redundant term. But it’s standard usage somehow. It’s very helpful to have this notion of single coincidence, meaning that I have something that you want. That is a kind of coincidence. So Paulus said this.

I don’t know about the last edition, but one edition of [Frederic] Mishkin’s very popular undergraduate money and banking textbooks has Mary or Alice as an economics professor. If she wants some apples, without money, she’d have to find an apple grower who wants an econom-

“Money is memory” is a hugely powerful idea. It leads you to think about various kinds of payment instruments in terms of the kind of informational structure that supports them.

When you use a credit card, you’re issued a loan. Why are you able to receive one? Because there’s an informational network behind your card. Your bank is actually guaranteeing your credit payment because they know something about you. The bank is keeping pretty good tabs on what you do.

ics lecture—and he didn’t go on and say almost no one wants an economics lecture, so she’s really in trouble [laughter]. In any case, that’s what the textbooks say, and this has been repeated.

Now, this story is incomplete. That’s what I tell students: It’s incomplete. *Why* is it incomplete? Well, think about some isolated pioneer family. At times, someone is going to not feel so well, so he or she isn’t going to be able to chop down wood for a fire. There’ll be lots of absence of double coincidences that arise in that family situation, many cases where one family member is called on to do a favor for another family member. Well, are they going to get paid for doing this favor?

Region: Of course not, not in a family.

Wallace: Right. Now think about Robinson Crusoe, after he meets Friday. They don’t need money, but again, there might be plenty of absence of double coincidences. Now think further. Here we are in the middle of Pennsylvania. There are

lots of Amish communities around here. When they’re isolated, the usual story about an Amish community—or an isolated Israeli kibbutz—is that they didn’t use money.

Region: Trust was their currency.

Wallace: Well, that’s a word that Douglas Gale used, but it’s probably not the best word. [See Gale 1978.] Think about this Amish community. The vision is, if my barn burns down, then everybody will come and help me rebuild it. In economics, we try to rationalize behavior without altruism, if we’re able to; so what makes that work without altruism? Everybody notices who shows up to help rebuild it.

Region: A sort of credit accounting.

Wallace: Yes. And the guy who doesn’t show up, if he does that repeatedly, will get kicked out eventually. This can work without money because people remember what people have done in the past.

Region: So, money is memory.

Wallace: Yes, “money is memory” is a casual way to state that. Now, that’s a hugely powerful idea that I and other people have been working with.

Region: Kocherlakota [1998], Ostroy [1973] and Townsend [1989], for instance.

Wallace: Right. And I think a lot more needs to be done. Let me mention one thing sort of related to that. People ask, what is money? Friedman and [Anna] Schwartz, in their monetary history, right at the beginning have a long discussion about money. Of course, he’s written about it extensively. So, what is money? They make a decision that they’re going to use, if I recall correctly, what we would call M2. You’ve heard of these subscript things?

Region: Sure, categories of money in the total stock of money. [See Bernanke

2006.] The Fed publishes monthly reports, for example, on quantities of M1 and M2, as they’re termed.

Wallace: Right. Now, I think the idea of adding up these quantities into some aggregate is a really bad idea.

“Money is memory” is a better idea. It leads you to think about various kinds of payment instruments in terms of the kind of informational structure that supports them. The money that is the best current counterpart to the “money is memory” idea is currency. You don’t need much of an informational network for currency; in fact, you probably don’t need any, except for worrying about counterfeiting.

When you use a credit card, you’re issued a loan. Why are you able to receive one? Because there’s an informational network behind your card. Your bank is actually guaranteeing your credit payment up to probably some large amount, as large as you mostly use. And they’re doing that because they know something about you.

Region: So that’s a form of memory about a person’s past transactions.

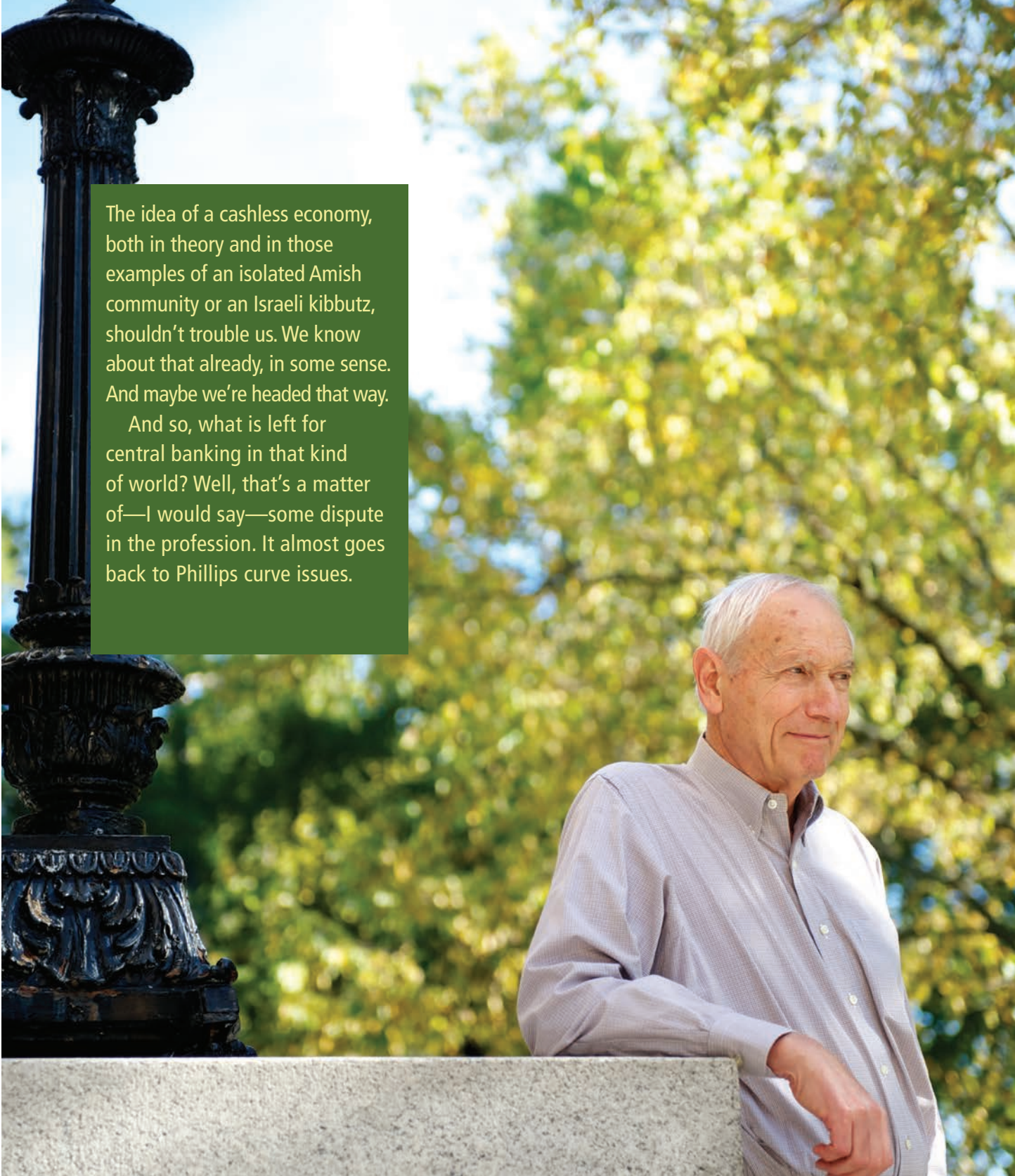
Wallace: Right.

Region: In a paper you just presented at the Minneapolis Fed, you wrote, “Money is potentially useful in trade between strangers. It is not needed when everyone knows what everyone else has done in the past.” Now, if you’ve got a credit card, the bank is keeping ...

Wallace: ... pretty good tabs on what you do.

A CASHLESS SOCIETY

Region: That leads to another question about technological advances and potentially a cashless society. We’ve got electronic payments, debit and credit cards. Now people use smartphones for retail purchases; soon we might use our



The idea of a cashless economy, both in theory and in those examples of an isolated Amish community or an Israeli kibbutz, shouldn't trouble us. We know about that already, in some sense. And maybe we're headed that way.

And so, what is left for central banking in that kind of world? Well, that's a matter of—I would say—some dispute in the profession. It almost goes back to Phillips curve issues.

fingerprints. They all reduce the need for cash and checks, so an even less physical representation of that M2 or whatever.

Does that mean that money itself is becoming less important—even as a recordkeeping device? If cash is less important, how does that change monetary theory?

Wallace: Well, you asked me earlier how I introduced money to undergraduates, and there I talk about an Israeli kibbutz where there's no money. The vision of that is a *small* community, which makes it easy for us to remember. But the idea of remembering actions, well, it doesn't have to be a small community. It's an abstract idea and, with the technology we now have, a lot can be remembered.

Region: Too much?

Wallace: It may be too much. But the idea of a cashless economy, both in theory and in those examples of an isolated Amish community or an Israeli kibbutz, shouldn't trouble us. We know about that already, in some sense. And maybe we're headed that way.

And so, what is left for central banking in that kind of world? Well, that's a matter of—I would say—some dispute in the profession. It almost goes back to Phillips curve issues, because it goes back to issues about whether prices are sticky or not, which was sort of at the heart of Phillips curve theories.

Region: And it still is central in a lot of New Keynesian work.

Wallace: Absolutely, it still is.

DEPOSIT INSURANCE, TBTF, MORAL HAZARD

Region: Let me ask you about a different area of your research, something you're very well known for. And again, it involved John Kareken. The two of you pioneered thinking about how government guarantees for bank deposits cre-

ate moral hazard, that they encourage undue risk-taking and therefore inefficient resource allocation. But at the same time, government guarantees for deposits are considered essential for banking.

These issues were central to some parts of the recent financial crisis, and then Dodd-Frank legislation tried to address some of that. I know you are reluctant to weigh in on specific policy issues, so I won't push it that way, but I wonder what general thoughts you've had about the factors behind this particular financial crisis and then the evolving relationships between financial institutions and the government since then.

Wallace: In some circles, Kareken and I get some credit for pointing out this risk-taking incentive of deposit insurance. But I don't know, it was pretty well known in some sense.

Region: You formalized the thinking on it.

Wallace: Maybe a bit, not all that well, but a bit. But let me introduce a second literature that's relevant to this question. Going way back, one of the issues that had troubled economists and that they weighed in on is the issue of fractional reserve banking or, more generally, how do we think about an illiquid banking system?

Region: Where a bank holds cash on hand just a portion of what customers have deposited.

Wallace: Sure, and you can think about this in terms of term-structure risk, so, in general, you want to describe banking illiquidity as a balance sheet which is unbalanced in terms of maturities: short-term liabilities and, on average, longer-term assets. Now, economists have weighed in on this for a long time. Some have said this is a natural thing. This is what banks are for.

Others have said this is dangerous, and we ought to regulate it out of existence. Henry Simons, for example, wrote

In general, you want to describe banking illiquidity as a balance sheet which is unbalanced in terms of maturities: short-term liabilities and, on average, longer-term assets. Some [economists] have said this is a natural thing. This is what banks are for.

a book called *Economic Policy for a Free Society*. And Friedman [1967] often credits him [with this idea]. Simons said it's not enough to force banks to hold 100 percent reserves. He said we should prevent limited liability institutions, like corporations, from issuing debt. (Now that's fairly ironic because what is the use of limited liability if you can't borrow?)

But he said you can tell people over and over again that a certain bond is risky, yet they're not going to act like it's risky. And then, when it fails to pay off, because they haven't anticipated that that might happen, it's chaos. So that's what he said, writing in the 1930s.

So on one side is a bunch of people who are saying banking system illiquidity—and maybe illiquidity more generally—is harmful; we ought to regulate it out of existence. And on the other side were people who vaguely said, "It's natural, that's the function of banks."

In 1983, Doug Diamond and Phil Dybvig published what to me was an eye-opening paper, a very simple, stripped down model, but one whose elements all seem quite reasonable. One element is that people can't fully plan the pattern of their future expenditures, so they want something like a demand deposit to be able to spend at any time. A spending opportunity might arise that they hadn't anticipated, so they want the flexibility of being able to spend at any time.

But giving them that flexibility in, say, the form of a demand deposit, allowing

them to withdraw whenever they want, means they might also withdraw not just when they want to spend but because they're worried about the [safety of that financial] institution.

Region: And if they withdraw for that reason, lots of other depositors might as well, creating a bank run.

Wallace: Right. Now, one element in the model is people's desire for flexibility. It's a little bit technical, but in the model, the realization of the spending desire is private information. So, as an example, when you go up to the bank window to make a withdrawal, it's not written on your forehead whether you genuinely want to make a payment or whether you're worried about the solvency of the bank. That information is private. Then a second element in the model is that the technology is such that longer-term investments have bigger payoffs than short-term investments.

Region: That's the maturity transformation, from short-term deposits to longer-term lending with higher returns. That's where the bank wants to put all those short-term deposits.

Wallace: That's why it's socially a good idea for those deposits to be used to finance this long-term investment. It's like wine, if you leave it in, it's going to turn good. If you withdraw it quickly, it's going to be just the grape juice that you started out with.

Region: A great analogy. So who steps in and makes sure that that transformation is possible?

Wallace: In some sense, this is a controversial model of banking. Certainly many, many people liked the Diamond-Dybvig model.

Earlier I said that Lucas' paper was a microeconomically coherent model of the entire economy. Well, so is Diamond-Dybvig, because it allows you to

think about what it would mean to impose 100 percent reserves. You can do that in that model, and then you can trace back to the welfare of the people in the model who are really, essentially, just the depositors. You can trace back to them the consequences of that policy in that model.

That's a huge accomplishment. The literature on banking has always been—like that on money—a troublesome literature. This goes back to economists' feelings that the general competitive model, often labeled the Arrow-Debreu model, is the main model in economics. It's very general. We don't need to have a special theory of production for bookcases and a special theory for bottled water.

But when people try to shove banking into this model, it's hugely unsuccessful. Why? Because anything that banks might be viewed as doing is redundant in that model. According to the Arrow-Debreu model, you face prices at which you can costlessly trade anything for anything. More generally, no activity that we see in the economy that has to do with transacting fits comfortably within that model. In particular, nothing in the GDP accounts that falls under the FIRE heading—finance, insurance, real estate—fits into that model.

Diamond-Dybvig overcame that. It was at the cost of abstracting from details that some people think are quite important. But still, it was a major breakthrough. It pointed out, for the first time, a social role for an *entire* illiquid financial system. Not just one bank, not just the banking system, it is a model of an *entire* economy. And it points out a social role for this economy to have a specific property of illiquidity—namely, if all these depositors try to withdraw at once, it's in trouble.

Region: So there's a social role for this kind of banking system, but it won't exist unless that private information that people might have, their worries about the bank's solvency, unless it's reassured by government, by deposit insurance.

Others have said this is dangerous, and we ought to regulate it out of existence. The literature on banking has always been—like that on money—a troublesome literature.

I don't know any research that answers the question, "Are we seeing the right degree of illiquidity?" This has come up repeatedly. Is that an instance of the right kind of maturity transformation that Diamond-Dybvig says has a social role? Or is it really just a combination of this risk-taking incentive—the moral hazard aspect of government guarantees—and this overselling of the quality?

Wallace: Now we have this Diamond-Dybvig model, which, if you buy into it, says some degree of illiquidity in the financial system plays a desirable social role. But we've also got this other side of things that says various loan guarantees potentially lead to too much risk-taking.

Region: That's the moral hazard.

Wallace: That risk-taking often takes the form of illiquidity. You read about what Bear Stearns was doing, what Lehman was doing. They were borrowing very short and financing long-term asset positions. You read casual accounts about Wall Street people going to pension funds and selling like they're used car salesmen. I mean, the way to overstate the quality of what you're selling in this area is to say it's safe and liquid.

Now, look at liquidity in a financial

system. On the one hand, this Diamond-Dybvig model says that some degree of system illiquidity is desirable. But we've also got this moral hazard aspect of various explicit and implicit forms of insurance *and* we've got this general desire to oversell, to overstate the quality of what you're trying to peddle.

When we look at the whole financial system, well, I don't know any research that answers the question, "Are we seeing the right degree of illiquidity?" This has come up repeatedly. In the Asian financial crisis, people were investing in these countries, but rather than making direct equity investments, they were giving short-term loans. Is that an instance of the right kind of maturity transformation that Diamond-Dybvig says has a social role? Or is it really just a combination of this risk-taking incentive—the moral hazard aspect of government guarantees—and this overselling of the quality of what you have?

Region: So legislation is hard-pressed to ensure the "right" degree of illiquidity.

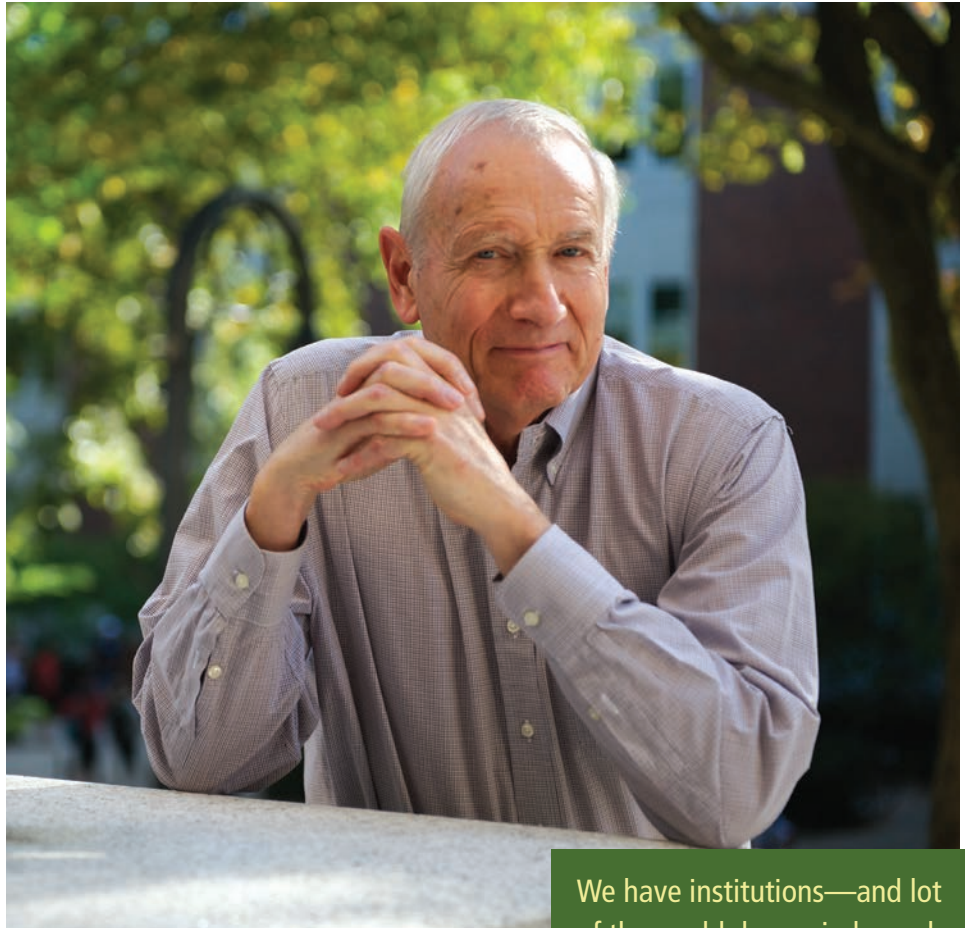
Wallace: It is.

QUANTITATIVE EASING

Region: Let me ask about another of your well-known papers, published in the *American Economic Review* in June 1981, "The Modigliani-Miller Theorem for Open-Market Operations." In it you established the "irrelevance proposition" akin to Modigliani-Miller's regarding corporate liability structuring, which said that whether a firm's debt is held as stocks or bonds has no effect on overall corporate value.

To vastly oversimplify, your proposition was that under a specific set of conditions regarding fiscal policy, the size and structure of a government's portfolio of debts and assets has no impact on the economy as a whole.

And in that paper, you made a "plea," that the proposition "should serve as the starting point for analyses of govern-



We have institutions—and lot of the world does—independent central banks and so on—that seem to create a separation between monetary and fiscal policy. But despite this separation into different institutions, you can't really separate monetary and fiscal policy. People own the government's portfolio and one way to talk about that ownership is that these different earning streams are handed back in the form of transfers of some sort.

ment asset exchanges." I think it's fair to say that economists heard your plea. In a very substantive way, it has served as the basis for much subsequent research on monetary policy, from Sargent and Smith in 1987 to Eggertson and Woodford in 2003, who wrote specifically that their work "was in the spirit of the irrelevance proposition for open-market operations of Wallace (1981)."

They suggested that quantitative easing, as it's known—large-scale asset purchases by central banks—is generally ineffective as a means of stimulating the economy, inferior in their minds to forward guidance. Other scholars have reached roughly the same conclusion, theoretically. Empirical work seems to show moderate impact at best. The Fed continues to debate the policy, of course; the FOMC is discussing it in Washington right this moment. And

markets these days react sharply to any talk of “tapering” QE.

What are your general thoughts about quantitative easing policies for large asset sales when we’re at the zero bound?

Wallace: I’m kind of surprised at the recent attention that this paper has gotten. Chris Sims, for example, remarked about it in his AEA presidential lecture. [See Sims 2013.] It’s right that the background model of that paper has money holding its own in terms of rate of return. That means that money has a high enough return that it is being held as an investment. When interest rates are at the zero lower bound, that’s certainly an example of money holding its own, in terms of rate of return.

Again, when I use the word “money” in this context, we might as well be thinking about currency. It’s very different from a situation where, say, T-bills are yielding 8 percent nominal and currency is yielding nothing.

So, that paper assumed that these assets were holding their own in terms of rate of return, which, by the way, is what the Modigliani-Miller theorem assumes about bonds and equities. It’s assuming that bonds and equities are packages of claims, and there’s a complete contingent market in claims, and these things are just bundles of claims.

Merton Miller is a very nice, modest guy. He has said something like, “Should I have really gotten a Nobel Prize for saying ‘no matter how you slice up a pie, it’s still a pie?’” That’s the way he characterizes the Modigliani-Miller theorem.

I was extending that conclusion to include currency, when the economy is at the zero lower bound. When it is, the Fed’s monopoly on currency becomes irrelevant, because there are short-term securities which are perfect substitutes for it because they have the same rate of return. Other people can issue those claims, hold them and so on, so there’s nothing special about the Fed’s monopoly on issuing currency in those circumstances.

Region: Which means that such asset-purchase policies should be pretty ineffective.

Wallace: Yes, they should be pretty ineffective. Part of that involves thinking about the interaction between monetary and fiscal policy. We have institutions—and a lot of the world does—independent central banks and so on—that seem to create a separation between monetary and fiscal policy. Some people think that’s very important.

Region: The independence of central banks.

Wallace: Yes. I don’t really have a view on that. I think it would take some rather deep political economy model to really rationalize that, but maybe it’s good. I don’t know, but despite this separation into different institutions [the central bank, Congress and the administration], you can’t really separate monetary and fiscal policy.

Region: It’s just dividing the pie different ways.

Wallace: Yes. If interest rates are positive and the Fed buys some Treasury bills and hands out zero-interest currency or zero-interest bank reserves, the way it used to be, there are fiscal consequences because the Fed turns over its interest payments, its earnings, to the Treasury.

The standard assumption that most policy models made about this was that when the Fed made this kind of open-market purchase, lump-sum taxes fell to leave the effect on the budget unchanged. Well, you can make that assumption in a model, but is that what really goes on?

But this 1981 paper said, in effect, that people own the government’s portfolio and one way to talk about that ownership is that these different earning streams are handed back in the form of transfers of some sort, and so it really is like a Modigliani-Miller theorem.

The models in which the invisible hand works, they don’t have fiat currencies. They’ve got cars and apples, where the value of these things is grounded in what we can do with them and that we like to eat them and things like that. You can’t do that with this stuff: money. So you don’t have this usual appeal. The key idea is potential perfect substitutability among different currencies, a potential that I expect to be realized unless there are legal restrictions that inhibit it.

FOREIGN EXCHANGE MARKETS

Region: Just a month before you published your *AER* paper on open-market operations, your article with John Kareken on exchange rates appeared in the *Quarterly Journal of Economics*. That paper with Kareken was closely linked to your 1979 Minneapolis Fed *Quarterly Review* piece, which had a much less technical title, which I love: “Why Markets in Foreign Exchange Are Different from Other Markets.”

Wallace: Does that title mean anything to you? Do you know where it comes from? Well, I’m Jewish by background, and at the Jewish holiday, Passover, there are meals called Seders, and there are these things called the four questions.

I don’t know what they are, exactly, but one of the kids at the table is supposed to ask, “Why is this night different from other nights? Why are we eating unleavened bread?” So I thought of that title, and I thought it was too good to waste!

Region: Many of your other titles, like that one, are wonderful. “Float on a Note” is another example. Well, in that QR piece, you said fiat money is different and “we should at least consider pursuing an explicit policy directed toward cooperative and permanent exchange market intervention or toward controls on asset holdings.”

That’s a pretty controversial statement, then and now, although I should mention that Minneapolis Fed economists took up that cause for a good decade.

Wallace: Did they?

Region: Art Rolnick and Warren Weber wrote their 1989 *Annual Report* essay, “A Case for Fixing Exchange Rates,” based on your work. [See Rolnick and Weber 1990.] But I think it’s fair to say that that proposition for market intervention in foreign exchange has little traction among economists generally, and policymakers, certainly. Why do you think that is, and do you still believe in the proposition, “indeterminacy,” as you’ve termed it?

Wallace: I do. Suppose Greece left the euro system and started up its own currency.

Region: Let’s call it the drachma.

Wallace: Sure. Greece returns to its old currency. Well, would it be easy to forecast what the demand for that currency would be? I mean, are we going to use one of Milton Friedman’s estimated demand functions for money to forecast that? I don’t think it’s so easy to do. You’d probably try to put in some restrictions to prevent people from continuing to use euros.

Region: But that’s intervention.

Wallace: Right. When there was agitation for an independent Quebec, the party advocating independence actually said, “We’re going to still use the Canadian dollar.” But suppose it had said, “No, we’re going to have our own currency.”

What would the demand for it be? The point of that article is to say, in part ... Well, had I thought about it, the U.S. has at several times tried to introduce a \$1 coin. One of those attempts was the Susan B. Anthony coin. So here’s another cute title, “Why Call the Susan B. a One?” Why not let it float? These currencies are different. When we say, let the market operate ...

Region: For cars or oranges.

Wallace: Yes. What’s that a reference to? That’s a reference to what economists call the first welfare theorem, which is the invisible hand. But the models in which the invisible hand works, they don’t have fiat currencies in them. They’ve got cars and apples in them, where the value of these things is grounded in what we can do with them and that we like to eat them and things like that. You can’t do that with this stuff: money. So you don’t have this usual appeal.

Now, if you read Milton Friedman carefully, you’ll sometimes find statements that sound like he’s appealing to the same thing he would appeal to for not regulating the prices of cars in terms of apples. But to be fair to him, he is mostly thinking differently. He’s going back to sticky prices, saying, why have millions of nominal prices change when we need to have international adjustment, as we would need to have if we had fixed exchange rates or a single currency? Why not let this just one price change? Let the drachma fall in terms of the euro. There’s essentially no formalization of that idea, but it is there.

The issue is why are different currencies other than perfect substitutes? Think about the border between the U.S. and Canada. There is a legal border. But what is the border regarding usage of the U.S. and Canadian dollar? Why does it have to correspond to the legal border? The more deeply it extends into Canada, the lower is the demand for Canadian currency, and with fixed supplies, the lower must be the relative

Despite rules intended to prevent the support of government bond markets in member states, the ECB [European Central Bank] seems to be doing just that. In the U.S., the Fed should maintain an orderly market in government securities. It seems a bit far-fetched to reconcile orderliness with default, but maybe. Thus, while one can imagine arrangements in which control of the price level is maintained in the presence of large and unsustainable government deficits, it rarely happens.

value of the Canadian dollar. And vice versa, if the border for currency usage extends into the U.S.

Hence, the key idea is potential perfect substitutability among different currencies, a potential that I expect to be realized unless there are legal restrictions that inhibit it.

REMAINING QUESTIONS IN MONETARY THEORY

Region: Let me ask you a question about remaining questions. Your research has addressed central issues in monetary theory, and in a 1985 Minneapolis Fed working paper (281), “Some Unsolved Problems for Monetary Theory,” you raised two key policy issues in monetary theory that remained at that point to be answered; we’ve talked about them both briefly today: Should interest be paid on money? And, should currency provision be in the hands of the government, rather than the market?”

Have they finally been resolved to your satisfaction?

Wallace: When I wrote those things in the 1985 paper, and when I wrote that 1981 paper on the irrelevance proposition, I was not working within models in which money is substituting for memory. Or to put it somewhat differently, I wasn't working within models that I would now defend as models in which money really has a beneficial role in the economy. For the past 15 years or so, I think I've been doing that.

Region: So we're closer.

Wallace: Well, I think we're closer.

FISCAL-MONETARY POLICY INTERDEPENDENCE

Region: We've spoken about the interaction of fiscal and monetary policy. You established that inherent link in "Some

Unpleasant Monetarist Arithmetic," with Tom Sargent, showing that because of that interdependence, price levels are determined by fiscal policy as well as central bank policy.

What implications does this have with respect to current budget deficits and the steady growth of entitlement expenditures? And do you have any thoughts on the notion that if a government were to permit sovereign default, theoretically, the central bank still could control price levels, at the risk of output drops?

Wallace: Yes, we can imagine arrangements under which large fiscal deficits are not monetized. In particular, when countries were on a gold standard, some may have gone through debt defaults while remaining on the gold standard. However, temporary suspensions from the gold standard were more common

One way that we advance in economics is someone invents a model for one purpose and then we see other purposes for it. A model was not originally designed to address those issues. And yet, the model allows us to think about those things.

for important countries—Britain during the Napoleonic Wars and at other times; the U.S. during the Civil War.

And despite rules intended to prevent the support of government bond markets in member states, the ECB [European Central Bank] seems to be doing

More About Neil Wallace

Current Positions

Professor of Economics, Pennsylvania State University, since 1997

Consultant, Federal Reserve Bank of Minneapolis, since 1969

Previous Positions

Professor, University of Miami, 1994-97

Professor, University of Minnesota, 1974-94;

Associate Professor, 1969-74;

Assistant Professor, 1964-69

Honors

Distinguished Fellow, American Economic Association, since 2012

Distinction in the Social Sciences, College of Liberal Arts, Penn State, since 2005

Fellow, American Academy of Arts and Sciences, since 2005

Fellow, Econometric Society, since 1981

Honorary Degree, Universidad del Pacifico, Lima, Peru, 1995

Publications

Prolific author of research articles published in refereed journals on an array of subjects related to monetary economics; co-author (with George McCandless) of *Introduction to Dynamic Economic Theory: An Overlapping Generations Approach*, Harvard University Press, 1991; co-editor (with John Kareken) of *Models of Monetary Economics* and *The Overlapping Generations Model of Fiat Money*, both published by the Federal Reserve Bank of Minneapolis in 1980

Education

University of Chicago, Ph.D., economics, 1964

Columbia University, B.A., economics, 1960

just that. In the U.S., as I recall, the Federal Reserve Act says that the Fed should maintain an orderly market in government securities. It seems a bit far-fetched to reconcile orderliness with default, but maybe.

Thus, while one can imagine arrangements in which control of the price level is maintained in the presence of large and unsustainable government deficits, it rarely happens.

FAVORITE RESEARCH

Region: You're well known for a number of key contributions to economics. We've talked about some of that work today: "Unpleasant Monetarist Arithmetic," the irrelevance proposition, your deposit insurance paper and the foreign exchange research, among other work. But other papers—some still unpublished—are far less known.

Looking back, which of your papers do you most like and which do you consider less valuable? Is this like picking among children? I don't want to put you in that position.

Wallace: No. It's not. It's kind of easy for me to answer.

Region: This is the only question where you haven't paused at considerable length before giving your answer!

Wallace: As I sort of indicated earlier, I went to good schools, went to Columbia as an undergraduate and it was a good experience. I mean, it was intellectually eye opening in a certain way. I went to the Bronx High School of Science, which is a good high school, but that wasn't intellectually eye opening at all. Then I went to the University of Chicago. It was an exciting place.

But I learned all my serious economics very slowly at the University of Minnesota. And I'm *still* learning. And I say this because I think my recent work is my best work.

I think that's possible for me because I started at such a low base [laughs] and I've been pretty lazy, so it's easy for me to improve because that's just the way it is.

Region: Well, I don't think many economists would agree with you. So, which papers? The one you just presented at the Minneapolis Fed? That was a draft, a working paper, "Alternative Neo-Keynesian Models for the Study of Optimal Monetary Policy."

Wallace: Yeah, that's a draft. You shouldn't use that title. I've actually changed the title of that thing, and I don't know whether I'm going to submit it anywhere. But the substance, yeah, I kind of liked that.

Region: Other papers come to mind?

Wallace: I'm fond of a little paper I did on the denomination structure of money. [See Wallace 2005.]

Region: Why do you like that one in particular?

Wallace: Well, one way that we advance in economics—and in other fields I think, too, but certainly in economics—is someone invents a model for one purpose and then we see other purposes for it.

Both that denomination structure paper and "Float on a Note" use a model that's been around for a while. They may not be dealing with the most important issues, but they use a model that was not originally designed to address those issues. And yet, the model allows us to think about those things. That's a fun and interesting thing.

Region: And it shows the utility of the model.

Wallace: That's right. It shows the value of the model because these were things that, you know, could not previously be talked about.

Region: Well, thank you for talking with us about all these things. I've really enjoyed this.

—Douglas Clement
Sept. 18, 2013

References

- Bernanke, Ben S. 2006. "Monetary Aggregates and Monetary Policy at the Federal Reserve: A Historical Perspective." Speech at the Fourth ECB Central Banking Conference, Frankfurt, Germany, Nov. 10.
- Friedman, Milton. 1967. "The Monetary Theory and Policy of Henry Simons." *Journal of Law and Economics* 10: 1-13.
- Gale, Douglas. 1978. "The Core of a Monetary Economy without Trust." *Journal of Economic Theory* 19: 456-91.
- Kocherlakota, Narayana. 1998. "Money Is Memory." *Journal of Economic Theory* 81: 232-51.
- Ostroy, Joseph M. 1973. "The Informational Efficiency of Monetary Exchange." *American Economic Review* 63: 597-610.
- Rolnick, Arthur J., and Warren E. Weber. 1990. "A Case for Fixing Exchange Rates." 1989 Annual Report. Federal Reserve Bank of Minneapolis. minneapolisfed.org/publications_papers/pub_display.cfm?id=677
- Sims, Christopher A. 2013. "Paper Money." *American Economic Review* 103: 563-84.
- Townsend, Robert M. 1989. "Currency and Credit in a Private Information Economy." *Journal of Political Economy* 97: 1323-44.
- Wallace, Neil. 2008. "Fiat Money." In *The New Palgrave Dictionary of Economics*, 2nd ed., edited by Steven N. Durlauf and Lawrence E. Blume.
- Wallace, Neil (author), Manjong Lee and Tao Zhu. 2005. "Modeling Denomination Structures." *Econometrica* 73: 949-60.