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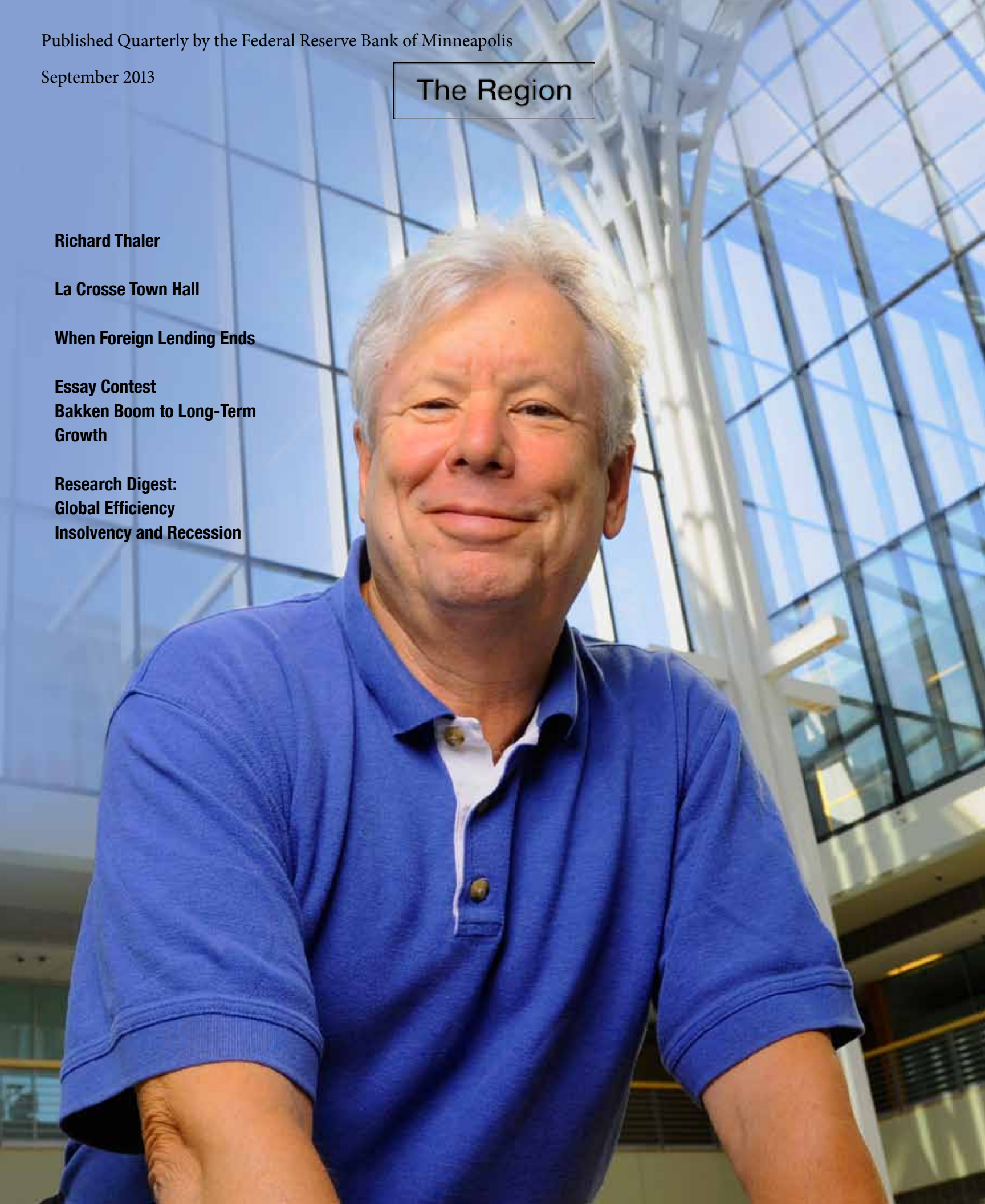

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The Region

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Cover photograph by Peter Tenzer

NINTH DISTRICT NOTES

La Crosse Town Hall

Questions and answers from Wisconsin are a great example of the two-way communication essential to good policymaking

Narayana Kocherlakota

President
Federal Reserve Bank of Minneapolis

On Sept. 4, 2013, I held a public town hall with citizens in La Crosse, Wis. This is the third such event I have held within the Ninth District, and I look forward to more in the future. These events have proven very useful for me, as a policymaker, to get a deeper understanding of the public's interest and concerns, and I hope they have proven just as useful for those in attendance.

As with the previous town halls, the one in La Crosse generated very good questions, both from the audience and from the moderator, Taggert Brooks, chair of the department of economics at the University of Wisconsin-La Crosse. What follows is an excerpt from that evening that captures some of the key questions on people's minds. The full conversation is available on our website, minneapolisfed.org.

Who holds the Federal Reserve Board accountable for its decisions?

This is a great question. And it's a great way to lead off the evening, because who holds the Federal Reserve Board accountable for its decisions is, of course, the American public. The Federal Reserve is a creation of Congress through the Federal Reserve Act, and it's only right that we be held accountable to the American public for our decisions.

Now, that happens in a variety of ways, which is true of a lot of governance situations, and things can get somewhat technical. Let me describe what I think is the primary method of accountability. Go back to January 2010, when Chairman Ben Bernanke was being considered for a second term as chairman of the Federal Reserve System. He had served a term from 2006 through 2010 and at that point was nominated for a second term. That nomination was up to the president of the United States to decide. He had to decide whether or not the vision, the strategy the Fed followed under Chairman Bernanke's leadership, was one that he felt comfortable with. If he had not felt comfortable with it, and he's elected by the people of the United States, he would've gone in a different direction.

Then there's a second check, a second form of accountability, which is that the nomination has to be confirmed by the Senate of the United States. There was a lot of discussion about whether the Senate felt comfortable with the performance of the economy under Chairman Bernanke's leadership and the vision with which Bernanke had led the Federal Open Market Committee. But after that discussion, Chairman Bernanke's appointment was confirmed by the Senate.

To go back over a five-year period, food prices have gone up around 2.2 percent per year, pretty close to the Fed's 2 percent target.

So I think that's the main way you see accountability working. That chain through the chairman being appointed by the president and confirmed by the Senate, I think is the main form of accountability.

Our next question concerns prices. It's what people pay attention to frequently. So they want to know what's causing food prices to go up.

Right, so this is another very good question. Let me talk a little more broadly about prices in general. The Fed moves interest rates up and down to try to influence demand. That influences prices. It doesn't just influence food prices, though. We don't have anything that can influence one particular price. We're trying to influence prices of all goods and services all at once. If we raise interest rates, that reduces people's desire to spend and firms' desire to spend today, and that will tend to push down on prices and push down on inflation. But it pushes down on all prices at once. And our goal then is to keep this bundle of goods and services that people buy, including food and energy—we're trying to keep that price growing at around 2 percent per year.

Now, what this question asks is what is causing food prices to go up by so much, and a very short answer to this question would be that food prices really aren't going up by that much. And why do I say that? Well, if I look at how much food prices have gone up over the past year—and this is going through the Bureau of Labor Statistics measures of the consumer price index—they've gone up less than 2 percent, around 1.4 percent over the past year. To go back over a five-year period, food prices have gone up around 2.2 percent per year, pretty close to the Fed's 2 percent target.

But I think that short answer doesn't cover it because I get this question all the time. And I think the right way to think about this is that it's not really a question about prices; it's really a question about wages. I think the reason people feel prices are going up by so much is because prices are going up by so much relative to their wages. Compensation growth in the United States has been very slow over the past five years and has been even slower over the past year. So if your compensation's not growing very rapidly, even a normal price increase feels like it's very sharp and very fast.

The reason it's important to distinguish these two is that the treatment from our point of view as monetary policymakers may well be quite different. The fact that wages are growing so slowly and compensation is growing so slowly is really a sign of some of the problems in the labor market. The fact that employment is so low—so many people are looking for work—that puts downward pressures on compensation, and that makes goods like food seem very expensive even if prices are growing at close to the normal rate of inflation. So that means your target at that point, the policy treatment, is really more stimulus and not so much cutting back on stimulus, which is what would be the right treatment if prices were actually growing more rapidly than our target.

I think the next question that naturally comes from that is, you mentioned earlier that inflation's below target, but the question this person asks is: How is low inflation even possible given that the Fed is buying so much in terms of long-term assets? How is it possible for inflation to be so low?

These are all excellent questions because they really get at the heart of what we're trying to do. … The Fed's transactions, known as quantitative easing, are just changing the maturity composition of outstanding government liabilities from long to more short. The reason it has only a modest impact on the U.S. economy is because this is a very modest transaction. You're just changing the composition of the assets, the liabilities that are outstanding by the government.

There is a positive effect on the economy associated with this by pushing down on long-term yields, by buying up these long-term securities and pushing down on long-term yields. That's a positive for the economy by stimulating the economy. But the effect is much more modest than this big number; $85

billion will make you think because this is actually really small compared to the pool of all long-term assets in the world. You're trying to push the long-term yield of everything in the world through this lever, and you're having an effect, but it's pretty modest.

The next question gets to the second part of the dual mandate and starts to talk about unemployment. They're interested in whether or not the Fed considers the numbers of people leaving the job market. The full question asked about the people in the labor force participation rate falling as people possibly give up on job search. They're wondering to what degree the Fed considers that job-leaving, if you will.

So let's start with basics, the way the Bureau of Labor Statistics reports what's called the unemployment rate. The way it's measured is they go out and survey a large number of households every month. They ask people in those households, do you have a job? If you have a job, you're called employed. Or if you don't have a job, have you looked for a job in the past four weeks? They add those two groups together, and that's called the labor force. The fraction of the labor force that's in the second group that is the searchers, people who looked for a job in the past four weeks, those are called the unemployed. The unemployment rate is a fraction of people in the labor force who are, in fact, unemployed.

Now, of course, there's a large number of other people who have not looked for a job in the past four weeks and don't have a job. The question is, how do you treat those? So the Bureau of Labor Statistics reports broader measures of unemployment, what they call labor underutilization. They'll ask questions about, OK, you haven't looked for a job in the past four weeks, but have you looked in the past year? And if a job would come along, would you take it? These people are called marginally attached.

This will lead to a higher measure of unemployment. But what's very interesting is these measures of unemployment, if you use the broader measure of unemployment, it tracks what's going on with the more usual form of unemployment pretty closely. So if you go back to December 2007, the usual unemployment rate that you hear was around 5 percent nationwide. It doubled by the end of 2009. It's come down now to about 7.4 percent. So it's about halfway back to where it was.

If you use a broader measure that includes folks who are marginally attached, it also doubled pretty much from late 2007 toward the end of 2009, and it's come down slowly. It's come down, but not as much, so the rest of the question is right on target. If you used this measure, you wouldn't be as comfortable with the state of the labor market even as unemployment is 7.4 percent. But it certainly has come down. So it's maybe about 30 to 40 percent on the way back as opposed to 50 percent on the way back.

Again, that's a long way of saying we do look at this, but even if you use these broader measures, it's telling us similar stories qualitatively.

This next question—I had to summarize it a lot, but it asks, are we doomed to repeat the past? The question really asks about what we're going to get back to. There's a lot of conversation about getting back to the previous unemployment rate. This person brings up the fact that the unemployment rate when I started here, I think the unemployment rate was 4.9 percent nationally. It was very low. Is this what we're trying to get back to, sort of the pre-bubble era? Or what are we trying to get back to?

This is another question that troubles us a lot at the Federal Reserve because we know there are a lot of examples throughout history where you get to an unemployment rate of 4 percent, and you can't get back to 4 percent without creating huge amounts of inflation, which is certainly not what we want to do. So we try to figure out, on an ongoing basis, where we think the unemployment rate will go in the longer run. Those estimates change.

So if we go back to the beginning of the recession, I just talked about it, in late '07, those estimates were somewhere between 4.5 percent and 5 percent. Now those estimates have moved upward to somewhere between 5.2 percert and 6 percent, as I described. So we have adjusted our measures of the long-run unemployment rate upward, indicating that we do think there's been some permanent damage to the labor market associated with the recession we just went through.

On the other hand, we do think at the same time that there's considerable room for the unemployment rate to decline without having much impact on the inflation rate. And there's a number of ways we try to go after this. We're looking at micro and macro data on the labor markets. But a simple way to see this is the fact that compensation growth is low, as I just mentioned. As long as compensation growth remains that low, it's hard to see labor market pressures creating undue levels of inflation.

This is kind of a follow-up. Is it a good idea in the long run to keep interest rates artificially low?

The answer is no. But I think it's important when we answer this to answer the question according to what the word "artificial" means. I think about artificial only in terms of how we're doing on our objectives. So, right now interest rates are artificially high. Why do I say that? Because unemployment is too high, inflation's running too low, and that means we're not providing enough stimulus. Seems like interest rates are actually not artificially low; in fact, they're artificially high.

You should not keep interest rates artificially low. Should we be keeping interest rates low in order to achieve our objectives? Yes. Have we made them low enough? No.

Now, I think when people ask this question, what they have in mind is, boy, interest rates have been low for a very long period of time. Or they might be thinking that interest rates have never been this low before, why do you have to have interest rates this low? I think the right analogy, at least the analogy I find helpful—economists always find weird analogies helpful—is really in terms of winter clothing. Suppose you see someone walking outside. It's May, and they're wearing a parka. You might say, you're wearing artificially too much clothing at that point. Well, it wouldn't be true in Minneapolis. We had snow in May in Minneapolis. So you should be wearing a parka in May in Minneapolis.

So it really depends on what the conditions are, what kind of clothes you need to put on to keep yourself warm. The parka in my example is the interest rate. It really depends on what the conditions are, not the time of year or how long it's been and all those things. So I think the issue of artificial … of course not, you should not keep interest rates artificially low. Should we be keeping interest rates low in order to achieve our objectives? Yes. Have we made them low enough? No.

So this next question I'm sure is from a group that doesn't exactly appreciate low interest rates as much as I do. Why are you punishing the elderly citizens who primarily use CDs for savings?

Yes, monetary policy is a tool that is designed to achieve these macroeconomic objectives I have described, low inflation and maximum employment. And it's definitely a tool that has distributional consequences. So that means there are going to be distributional consequences.

The way I think about these kinds of questions, though, is that the Fed is merely responding to economic conditions. We are facing the same environment that the elderly citizens mentioned in this question are facing. The problem we face is this: After the recession of 2007, the financial crisis that took place five years ago, people are nervous and uncertain and they want instruments for saving. They want to save. These aren't just people in the United States. Everyone around the world wants to save, and they want sources of safety. They don't want to save by buying a random mortgage-backed security that's issued by some Wall Street firm now. They might have been happy doing that in 2005. They want to be buying something that's safe. And everyone wants to do that.

That's why we have to lower interest rates as much as we do to try to hit our targets. That's why the interest rates that you face as someone who is saving—if you try to do the same thing as everyone else in the economy, you always pay a high price and get a low return. That is what's happening to these [elderly citizens the question refers to]—everyone else is trying to do the same thing they would normally want to do anyway. So they're going to have to pay a high price, and it translates into a low yield. The thing we need to get to is a more secure world, a safer world where people don't feel such a pressure to save for the future. R

What Will Happen When Foreigners Stop Lending to the United States?

Editor's note: This is an adapted version of a longer Economic Policy Paper by the same title online at minneapolisfed.org.

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The global saving glut

From 1992 to 2012, households and the government in the United States borrowed heavily from the rest of the world. As U.S. borrowing—measured as the current account deficit—grew, the U.S. net international investment position deteriorated by $4 trillion (2012 USD), and, by 2012, the United States owed the rest of the world $4.4 trillion. In this paper, we use a model developed by the authors (Kehoe, Ruhl and Steinberg 2013) that captures this increase in borrowing to study two ways the United States might reverse its current account deficit and begin to pay down its accumulated debt. Our hypothesis for the driving force behind the United States' borrowing is the *global saving glut* theory proposed by Ben Bernanke. In a March 2005 address, he asked:

> "Why is the United States, with the world's largest economy, borrowing heavily on international capital markets—rather than

* The authors thank David Backus, Kei-Mu Yi and Frank Warnock for helpful discussions. Participants at seminars and conferences made useful comments and suggestions. The authors are grateful to Jack Rossbach for extraordinary research assistance. The data presented in the figures are available at http://www.econ.umn.edu/~tkehoe/.

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

Since the early 1990s, the United States has borrowed heavily from its trading partners. This paper presents an analysis of the impact of an end to this borrowing, an end that could occur suddenly or gradually.

Modeling U.S. borrowing as the result of what Bernanke (2005) calls a *global saving glut*—where foreigners sell goods and services to the United States but prefer purchasing U.S. assets to purchasing U.S. goods and services—we capture four key features of the United States and its position in the world economy over 1992–2012: (1) in the model, as in the data, the U.S. trade deficit first increases, then decreases; (2) the U.S. real exchange rate first appreciates, then depreciates; (3) the U.S. trade deficit is driven by a deficit in goods trade, with a steady U.S. surplus in service trade; and (4) the fraction of U.S labor dedicated to producing goods—agriculture, mining and manufacturing—falls throughout the period.

Using this model, we analyze two possible ends to the saving glut: an orderly, gradual rebalancing and a disorderly, sudden stop in foreign lending as occurred in Mexico in 1995–96. We find that a sudden stop would be very disruptive for the U.S. economy in the short term, particularly for the construction industry.

In the long term, however, a sudden stop would have a surprisingly *small* impact. As the U.S. trade deficit becomes a surplus, gradually or suddenly, employment in goods production will not return to its level in the early 1990s because much of this surplus will be trade in services and because much of the decline in employment in goods production has been, and will be, due to faster productivity growth in goods than in services.

AT THE END

HOW BAD WILL IT BE?

> lending, as would seem more natural? … [O]ver the past decade a combination of diverse forces has created a significant increase in the global supply of saving—a global saving glut—which helps to explain both the increase in the U.S. current account deficit and the relatively low level of long-term real interest rates in the world today" (Bernanke 2005).

The essence of the global saving glut theory is that increased saving in the rest of the world, recently primarily in China, but before that in Japan and Korea, resulted in foreigners purchasing U.S. assets rather than U.S. exports. As foreigners sold goods and services to the United States to finance these asset purchases, the price of their goods and services fell relative to U.S. prices.

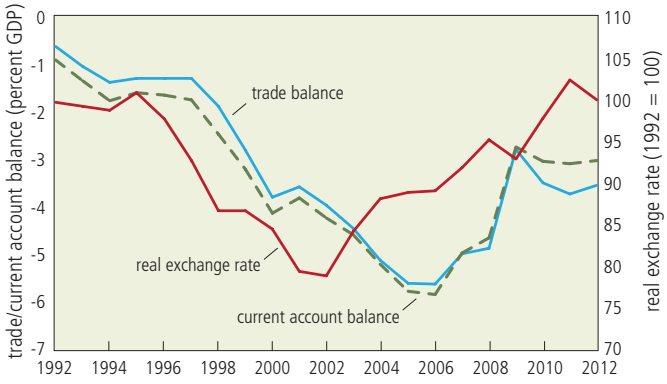
The balance of payments identity says that payments by U.S. residents to rest of the world (ROW) must equal payments by the rest of the world to U.S. residents. This identity holds at all times simply because accounting conventions calculate it so that it will: An excess of payments made by the rest of the world over payments made by U.S. residents, for example, is counted as purchases of assets in the rest of the world by U.S. residents, that is, U.S. residents borrowing from foreigners.

We can rearrange the terms of this identity arithmetically to say that the U.S. trade balance plus net factor payments and transfers from the rest of the world are equal to net U.S. asset accumulation in the rest of the world. The first half of this (trade balance plus net factor payments and transfers from the rest of the world) is commonly referred to as the current account balance. The current account balance is therefore equal to net U.S. accumulation of foreign assets.

Because net factor payments and transfers from the rest of the world are small, the U.S. current account balance is approximately equal to the U.S. trade balance. This near equivalence is seen in Figure 1, where the two trend lines run closely together. Consequently, the balance of payments identity says that the trade deficit is approximately equal to foreign accumulation of U.S. assets. The figure therefore shows that as foreigners bought U.S. assets, the U.S. trade balance and current account balance both declined from somewhat negative positions in 1992 to substantially negative positions of about -6 percent GDP by 2005-06.

Figure 1

U.S. trade balance, current account balance and real exchange rate



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.

Figure 1 also presents data on prices in the United States relative to those in the rest of the world, the real exchange rate between the U.S. dollar and a weighted geometric average of the currencies of its 20 most important trading partners. As the real exchange rate falls, fewer U.S. consumption baskets trade for one consumption basket of its major trading partners, and the dollar appreciates.[1]

Between 1992 and 2002, the real exchange rate between the currencies of the United States and its major trading partners fell significantly, resulting in a nearly 28 percent increase in prices of U.S. goods and services relative to product prices of trading partners (or, equivalently, prices in the rest of the world fell by 22 percent).

After 2002, however, relative price trends ran in the opposite direction. The real exchange rate rose and the dollar depreciated by 22 percent. The U.S. trade balance—and the current account balance—also rose; the reversal in the balance of trade and current account balance began about four years later.

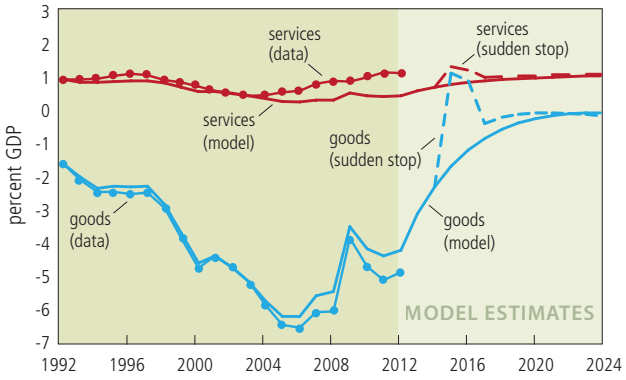
The Kehoe-Ruhl-Steinberg model

For our analysis of the impact of an end to foreign lending, we use a standard dynamic general equilibrium model of two "countries": the United States and the rest of the world. Details of our framework, calibration and parameter selection are described fully in Economic Policy Paper 13-4 and Staff Report 489 online at minneapolisfed.org. For this discussion, it is important to note a few key features of the model.

- We split production into three industries—goods, services and construction. These are not typical categories used in international macroeconomics; standard methods consider services to be nontradable among nations. Data clearly indicate, however, that services are in fact traded (see Table 1 in Economic Policy Paper 13-4). Indeed, the United States had a large surplus in services trade in 1992, while it had a large deficit in goods trade. The 1992-2012 data in Figure 2 (dotted lines) show that this pattern persists over time. Our model (solid lines) closely matches this pattern between 1992 and 2012.

Figure 2

U.S. trade balance in goods trade and services trade: data and model



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Model estimates in solid lines. Data in dotted lines. Services in red; goods in blue.)

- We select two other parameters—one for goods and one for services—that govern substitutability between imports and domestic output for final uses. We choose these parameters to be consistent with the higher volatility in the goods trade balance seen in Figure 2; that is, we assume that foreign goods are more substitutable for U.S. goods than foreign services are for U.S. services. Nonetheless, foreign goods are still less-than-perfect substitutes for U.S. goods in our model: That imperfect substitutability allows us to model the saving glut as driving down the relative price of foreign goods and forcing the U.S. real exchange rate to appreciate.

- As in the United States, households in the rest of the world work, consume and save to maximize utility. They also have similar preferences: They enjoy leisure and regard imports of U.S. goods and services as substitutes for domestic ones, with the same elasticity of substitution as in the United States.

Generating the saving glut

In our model, the saving glut is generated by the "intertemporal decision-making" of households in the rest of the world. By this, we mean that the overall quantity of investment in U.S. bonds is determined by choices foreign households make each year about how much they favor work relative to leisure and prefer consumption now relative to consumption later (which requires saving current income).

To match the data on trade balances from 1992 to 2012, we set these intertemporal weights such that the rest of the world discounts less (that is, places more value on) the future than U.S. households. That induces foreign households to postpone current consumption so as to be able to consume more later. They do so by saving current income through purchase of U.S. bonds.

After 2006, the peak of foreign lending to the United States, this trend reverses: The rest of the world's discount factor gradually converges to that of U.S. households—the saving glut diminishes—and the world economy converges to a balanced growth path.

We model the sudden stop in 2015–16 in the same

manner as Kehoe and Ruhl (2009), who model the Mexican sudden stop of 1995–96 as a surprise. During the sudden stop, the rest of the world buys no more bonds, but households and the government in the United States make interest payments on existing bonds at the 2014 interest rate. The U.S. interest rate during the sudden stop is determined within the United States since there is no foreign lending.

We model the sudden stop as a surprise because U.S. interest rates currently indicate that financial markets do not assign a significantly positive probability to a U.S. debt crisis—as was the case for Mexico in 1995 and is currently for ongoing eurozone debt crises (Arellano, Conesa and Kehoe 2012).

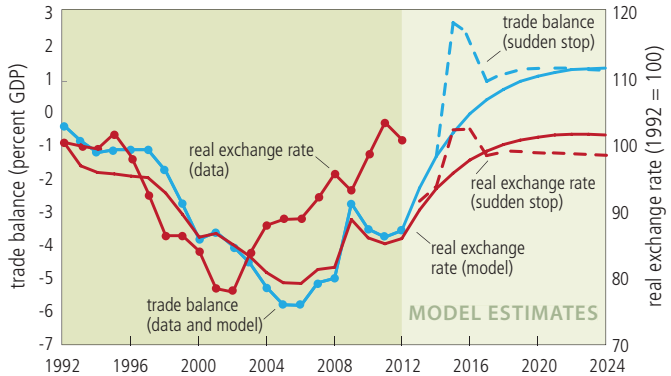
Dynamics of the trade balance

Our model of the saving glut is designed to capture the impact of government policies in the rest of the world that may be been responsible for the saving glut, such as Chinese policies that discouraged consumption and promoted saving, or policies that kept the Chinese real exchange rate from appreciating against the U.S. dollar. It can also be seen as capturing factors that make U.S. saving more attractive for foreigners than saving in their own countries.[2]

Our view is that the saving glut is a temporary, albeit lengthy, phenomenon and that discounting of the future by the rest of the world will eventually revert to a value consistent with balanced growth. Bernanke (2005) takes a similar perspective.[3]

Figure 3

U.S. trade balance and real exchange rate: data and model



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Model estimates in solid lines. Sudden stop estimates in dashed lines. Data in dotted lines. Real exchange rate in red; trade balance in blue.)

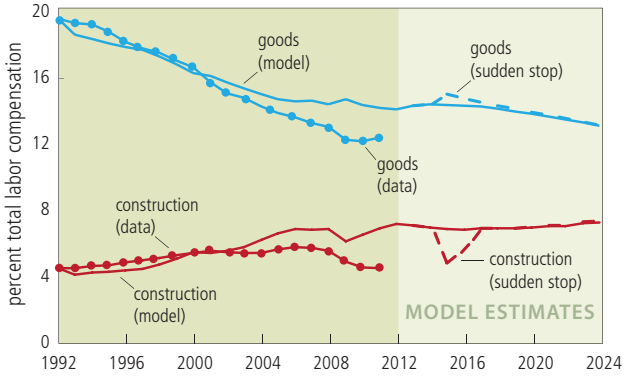
In other words, the current account imbalances associated with the saving glut will end eventually. The only question is whether the rebalancing process will be gradual or sudden.

Figure 3 reports the results of two experiments, one with gradual rebalancing and the other with a sudden stop in new foreign loans to the United States in 2015–16. As explained, the model has been calibrated so that it exactly matches the U.S. trade balance in 1992–2012. The model matches the actual behavior of the U.S. real exchange rate during 1992–2002, though in the model the depreciation of the U.S. real exchange rate starts after 2006, while in the data it starts four years sooner.

The model also captures much of the sectoral reallocation of labor during the saving glut, at least until the 2008–09 recession (Figure 4). It captures 78 percent of the actual decline in labor compensation going to workers in the goods industry and slightly overestimates the rise in compensation received by construction workers.[4] The model does a relatively poor job of capturing the collapse of the construction boom during 2008–12.

Figure 4

Allocation of U.S. labor across sectors: data and model



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Model estimates in solid lines. Sudden stop estimates in dashed lines. Data in dotted lines. Construction in red; goods in blue.)

The intuition for the model's performance is straightforward: During the saving glut, foreigners buy more U.S. bonds and fewer U.S. goods and services. To finance their bond purchases, the rest of the world sells its goods to the United States, lowering the relative price of these goods. This shows up in appreciation of

the U.S. real exchange rate. These foreign goods imports allow U.S. labor to shift from goods production to the production of services and construction.

In an experiment without a saving glut, labor compensation in goods production falls less than in a model with a saving glut, but still quite substantially. But the experiment also reveals that most of this drop is due to faster growth in productivity in manufacturing rather than to imports of foreign goods.

Notice in Figure 3 that, if a sudden stop were to occur, it would have a very disruptive impact on the U.S. economy, causing the exchange rate to depreciate rapidly and the trade balance to move rapidly into a substantial surplus. Figure 2 shows that much of the improvement in the U.S. trade balance would come from goods trade because U.S. services are not very substitutable for services in the rest of the world. In Figure 4, we see that the U.S. construction industry would crash and its labor would be reallocated to goods and services production. In our baseline model, this reallocation is modeled as costless. In alternative models *with* adjustment costs, the sudden stop is far more costly, echoing concerns expressed by Bernanke (2005):

> "To repay foreign creditors, as it must someday, the United States will need large and healthy export industries. The relative shrinkage in those industries in the presence of current account deficits—a shrinkage that may well have to be reversed in the future—imposes real costs of adjustment on firms and workers in those industries."

What do we learn from the model?

As we can see in Figures 2, 3 and 4, our model captures four key features of the United States and its position in the world economy over 1992–2012. In the model, as in the data:

- the U.S. trade deficit first increases, then decreases;
- the U.S. real exchange rate first appreciates, then depreciates;
- the U.S. trade deficit is driven by a deficit in goods trade, with a steady U.S. surplus in service trade;
- the fraction of U.S. labor dedicated to producing goods falls throughout the period, with most of the drop due to higher productivity in goods than in services.

The model's success in replicating these key facts over the last two decades gives us some confidence in its predictions for the future. As seen in Figure 3, the model predicts that after 2012, the U.S. real exchange rate will depreciate as U.S. households and government begin to repay the rest of the world. Much of the U.S. trade surplus will be in services trade and, if productivity in goods continues to grow faster than that in services (as it did over 1992–2012), employment in goods, particularly in manufacturing, is unlikely to ever return to its level in 1992 (Figure 4).

These changes will occur whether the stop in foreign lending is sudden or gradual. A sudden stop, however, would be very disruptive to the U.S. economy. Construction, unlike goods and services, is completely nontradable, so it would absorb much of the real exchange rate depreciation. During a sudden stop, the U.S. real interest rate would jump from 2.9 percent in 2014 to 5.5 percent in 2015. A sudden stop would cause a sharp contraction in construction output and employment, even more severe than during the collapse of the recent U.S. housing boom (see the sudden downturn in the construction trend line in Figure 4).

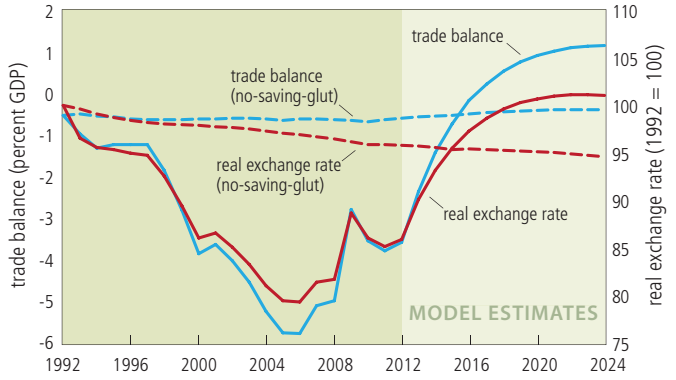
A sudden stop would also change the welfare analysis of the global imbalances over the period 1992–2012. Twenty years of inexpensive foreign goods—as well as the credit with which to purchase these goods—has made U.S. households better off. We calculate the increase in real income of U.S. households generated by the saving glut as equivalent to giving these households an extra $689 billion in income in 1992, 10.9 percent of 1992 U.S. GDP.

If the saving glut were to end in a disorderly sudden stop, where productivity falls as it did in Mexico in 1994–95, these welfare gains would be lost. U.S. households would suffer a real income loss of $330 billion (1992 USD), 5.2 percent of 1992 U.S. GDP, compared with a scenario in which the saving glut had never occurred. That is, the total cost of a disorderly sudden stop would be 16.1 percent of 1992 U.S. GDP, or over $1 trillion ($689 billion plus $330 billion). These calculations come from a model in

which the costs of the sudden stop come from its surprise nature and from the drop in productivity. If the model includes adjustment frictions, the estimate of real income loss is larger.

Figure 5

U.S. trade balance and real exchange rate



Note: Data are available at http://www.econ.umn.edu/~tkehoe/.
(Saving-glut data and estimates in solid lines. No-saving-glut data and estimates in dashed line. Real exchange rate in red; trade balance in blue.)

Directions for future research

Our results leave puzzles that suggest directions for future research. Most notably, our model generates only a small decline in interest rates between 1992 and 2012, in stark contrast to the data. Second, it is puzzling that using a U.S. saving drought (rather than a global saving glut) as the source of global imbalances over the past 20 years generates very inaccurate results for U.S. investment. And third, our model generates incorrect results on the timing of U.S. exchange rate depreciation; as mentioned previously, this depreciation actually began in 2002, but the model shows a 2006 beginning for this trend. These three puzzles and avenues for resolving them are discussed at length in the online version of this paper.

What should policy makers do?

That the long-term impact of the saving glut on the U.S. economy does not depend on whether it ends suddenly or gradually does not mean that the glut has not had a long-term impact. On the contrary, the impact has been substantial, generating as much as an 11 percent increase in real GDP, as mentioned above. Figure 5 shows further evidence of how large the long-term impact has been. And indeed, to repay its debt to foreign lenders, the United States will have to run a substantial trade surplus in future years. The purchasing power of the U.S. dollar—as measured by the reciprocal of the real exchange rate—will be lower. Output and employment in goods will be higher.

While U.S. households have benefited from two decades of low-priced foreign goods, these welfare gains could be fully erased, and even reversed, by a disorderly sudden stop in foreign lending. Policymakers should be vigilant to ensure that a sudden stop does not take the U.S. financial sector by surprise, as it was by the collapse of the U.S. housing market during the 2008–09 recession.

The need for prudential regulation in the U.S. financial system to prevent a sudden stop in foreign lending from becoming disorderly might seem to imply the need for capital controls, a policy currently under consideration in the eurozone (Fahri and Werning 2012, and Benigno et al. 2013). We believe such a step would likely be unwise for the United States. The United States is in a unique position as the provider of the world's reserve currency, and capital controls on purchases or sales of U.S. assets—especially of U.S. government bonds—would push foreign governments toward other reserve currencies. Since the United States enjoys substantial economic benefit from providing the world's reserve currency, we think it unlikely, and probably undesirable, for U.S. policymakers to consider capital controls to guard against a disorderly sudden stop. R

Endnotes

[1] The real exchange rate between the U.S. dollar and the Chinese renminbi, whose principal unit is the yuan, for example, is

U.S.-China real exchange rate = U.S.-China nominal exchange rate x (Chinese CPI ÷ U.S. CPI),

where we measure the price level in each country using its consumer price index (CPI). To understand this real exchange rate, consider the units in which it is measured:

(dollars÷yuan) x ((yuan÷Chinese consumption basket) ÷ (dollars÷U.S. consumption basket)) = U.S. consumption basket ÷ Chinese consumption basket.

As the real exchange rate falls, fewer U.S. consumption baskets trade for one Chinese consumption basket, and the dollar appreciates.

[2] Notice, however, that, besides modeling U.S. government spending and borrowing during 1992–2012, we do not model U.S. government policies such as monetary policies or policies to promote mortgage borrowing that may have been responsible for the massive U.S. borrowing during this period. See Obstfeld and Rogoff (2009) and Bernanke et al. (2011) for discussions of these policies and their interaction with the saving glut. We later argue, however, that it is unlikely that global imbalances over the period 1992–2012 were driven by lack of saving in the United States. That would imply that U.S. investment was low when in reality investment was quite significant throughout this period.

[3] "[T]he underlying sources of the U.S. current account deficit appear to be medium-term or even long-term in nature, suggesting that the situation will eventually begin to improve, although a return to approximate balance may take some time. Fundamentally, I see no reason why the whole process should not proceed smoothly. However, the risk of a disorderly adjustment in financial markets always exists" (Bernanke 2005).

[4] In the data, workers in the goods industry received 19.7 percent of total U.S. labor compensation in 1992. By 2007, this number had fallen to 13.3 percent. In the model, the labor compensation that goes to workers in the goods industry goes from 19.7 percent in 1992 to 14.7 percent in 2007.

In construction, workers received 4.4 percent of total labor compensation in 1992 data, rising to 5.6 percent in 2007, the peak of the construction boom. In the model, reallocation toward construction is actually larger, going from 4.4 percent of total labor compensation in 1992 to 6.8 percent in 2007.

References

C. Arellano, J. C. Conesa and T. J. Kehoe (2012), "Chronic Sovereign Debt Crises in the Eurozone, 2010–2012," Federal Reserve Bank of Minneapolis Economic Policy Paper 12-4.

G. Benigno, H. Chen, C. Otrok, A. Rebucci and E. R. Young (2013), "Capital Controls or Real Exchange Rate Policy? A Pecuniary Externality Perspective," Inter-American Development Bank Working Paper IDB-WP-393.

B. S. Bernanke (2005), "The Global Saving Glut and the U.S. Current Account Deficit," speech delivered at the Sandridge Lecture, Virginia Association of Economists, Richmond, Va., March 10.

B. S. Bernanke, C. Bertaut, L. P. DeMarco and S. Kamin (2011), "International Capital Flows and the Returns to Safe Assets in the United States, 2003-2007," Board of Governors of the Federal Reserve System, International Finance Discussion Paper 1014.

E. Farhi and I. Werning (2012), "Dealing with the Trilemma: Optimal Capital Controls with Fixed Exchange Rates," NBER Working Paper 18199.

T. J. Kehoe and K. J. Ruhl (2009), "Sudden Stops, Sectoral Reallocations and the Real Exchange Rate," *Journal of Development Economics*, 89, 235–249.

T. J. Kehoe, K. J. Ruhl and Joseph B. Steinberg (2013)," Global Imbalances and Structural Change in the United States," Federal Reserve Bank of Minneapolis Staff Report 489.

M. Obstfeld and K. Rogoff (2009), "Global Imbalances and the Financial Crisis: Products of Common Causes," CEPR Discussion Paper 7606.

Richard Thaler

We are rational, self-interested optimizers: Homo economicus. So the neoclassical model of economics has held for over a century. It has been a fruitful model, at the heart of the discipline's most profound theories, predictions and policy prescriptions.

According to Richard Thaler, it is also flawed.

Humans in the real world, Thaler points out, often behave in ways that are strikingly inconsistent with rational models, are frequently concerned with the welfare of others (even to their own detriment) and are rarely capable of optimization. True, we can be rational, calculating, self-centered and disciplined—but within limits.

This is the essential insight that Thaler insists his fellow economists use to modify neoclassical theory. Without it, findings will hold little relevance to reality. He illustrates this regularly with research into areas as disparate as health care, retirement planning, investing, NFL football drafts and British game shows.

The insight doesn't sound especially revelatory; we all know we're flawed beings, not models of rational optimization. Nonetheless, the burgeoning field of behavioral economics has long encountered stiff resistance. When Thaler first became intrigued by behaviors that contradicted the standard model—"anomalies," he later called them—his thesis adviser was "unimpressed," he recalls, and told him to go back to running regressions.

Thaler is thoroughly schooled in mainstream economics. By no means does he reject the fundamentals—supply and demand, for example, or cost-benefit analysis. It's just that the frame of analysis needs considerable broadening. He has taught for years at the University of Chicago—long considered a bastion of neoclassicism—and maintains a sharp, healthy and often humorous exchange with his skeptics there.

Indeed, it's fair to say that Thaler himself is something of an anomaly, an iconoclastic thorn repeatedly pointing out that traditional models are inadequate and arguing that "basing descriptive … models on more realistic conceptions of economic agents is bound to increase [their] explanatory power."

Over time, his views and those of other behavioralists have been accepted more widely. The 2002 Nobel Prize in economic sciences, for example, was awarded to Daniel Kahneman, a Thaler collaborator since the late 1970s, for integrating insights from psychology into economics—a crisp definition of behavioral economics.

Another sign: In 2015, Thaler will become president of the American Economic Association—an ironic but telling indicator of the gradual embrace of behavioral economics by a profession undergoing continuous evolution.

Photographs by Peter Tenzer

THALER'S RESEARCH AGENDA

Region: I'd like to start with your research agenda and its evolution. You'll correct me if I'm mistaken, of course, but your dissertation and immediate subsequent work in the 1970s was on the value of a life and of property, and you examined labor markets and property crime prevention to estimate them. That research was squarely within the mainstream of the discipline, based on expected utility theory.

Thaler: Yes, it was.

Region: But by 1980, it seems, your focus had changed to the limits of and alternatives to the standard model. You published "Toward a Positive Theory of Customer Choice" that year, discussing deviations from conventional normative theory, and another piece on decision-making under uncertainty that was subtitled "What Economists Can Learn from Psychology." Then you wrote papers with H. M. Shefrin, including your *Journal of Political Economy* piece on self-control that posited a conflict within an individual's psyche. And soon you were working with psychologists **Daniel Kahneman and Amos Tversky.***

Thaler: Right.

Region: This work all blended economics with psychology, as has your subsequent research. What led to that transition from the traditional model? Do you view it as a major discontinuity or a more gradual evolutionary process?

Thaler: I have been thinking a lot about this period recently because I'm working on a new book that will contain quite a bit about the history of the field, at least as I experienced it. The chronology you have is right, but a little bit misleading. In 1975 …

Region: Soon after you'd completed your doctorate?

Thaler: Right. I went to a conference and met a couple of psychologists, Baruch Fischhoff and Paul Slovic, who introduced me to the work of Kahneman and Tversky. I read K&T's research, got excited about it and set out to meet them.

I arranged to spend a year at Stanford, at NBER West, '77, '78 because Kahneman and Tversky were going to be there.

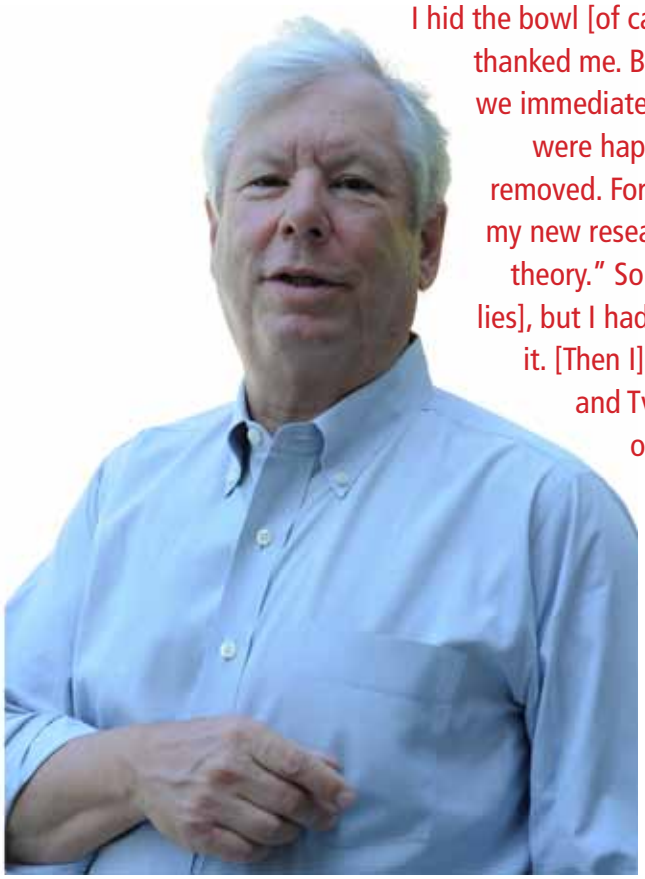
You're right—my thesis was purely neoclassical. My thesis adviser was Sherwin Rosen, who was very much a Chicago price theory guy. And my thesis was a straight econometrics exercise: How much do you have to pay people to get them to take risky jobs?

During my doctoral research, I also spent some time asking people a variety of questions—they appear in the 1980 paper, but I had done them when I was in grad school—and a version of it was, "Suppose, by having lunch with me today, you expose yourself to a one-in-a-thousand risk of dying. How much would you pay to eliminate that risk? And how much would you have to be paid to take that risk?"

Now standard economic theory says that those answers have to be approximately the same. But I got answers that were off by two or more orders of magnitude. Many people would say, "I'd pay $5,000 [to eliminate the risk]." And they'd also say, "I wouldn't do it for a million dollars."

Region: What kind of sample was that? Grad students, only academics?

Thaler: Yes, students in classes I was teaching, but I would ask everybody. I mean, I wouldn't say these were formal experiments at this point. I showed these to Rosen, who was unimpressed and told me to go back to running regressions.



I hid the bowl [of cashews] … and everyone thanked me. But as econ grad students, we immediately started asking why we were happy about having a choice removed. For years, friends referred to my new research interests as "cashew theory." So I had this list [of anomalies], but I had no idea what to do with it. [Then I] "discovered" Kahneman and Tversky. [I] spent hundreds of hours talking to both of them and taking walks with them. They didn't know anything about economics. I didn't know anything about psychology, so there were gains from trade.

*Terms in blue are defined in a glossary on pages 27-28.

But I was interested in this discrepancy. And then I started collecting "behaviors."

Region: "Anomalies."

Thaler: Yes, later I would call them **anomalies**, but for a while I just called them "the list." And I started writing a list of funny behaviors on my blackboard, such as paying attention to sunk costs. I mean, at first they were just stories. Like, a buddy of mine and I were given tickets to a basketball game. Then there's a blizzard and we don't go. But he says, "If we had paid for the tickets, we would have gone."

Another thing on the list was a story about having a group of fellow grad students over for dinner and putting out a large bowl of cashew nuts. We started devouring them. After a while, I hid the bowl in the kitchen and everyone thanked me.

But as econ grad students, of course, we immediately started asking why we were happy about having a choice removed. For years, some of my friends referred to my new research interests as "cashew theory." So I had this list, but I had no idea what to do with it. It was just a list.

Region: Of quirky human behavior.

Thaler: Yeah, quirky human behavior, right. And that was where I was when I met Fischhoff and Slovic and "discovered" Kahneman and Tversky.

The research of theirs that I read then, in 1975, was about what they called "heuristics and biases," things like **anchoring** and the **availability heuristic.** But there was one meta-idea in their papers, which was "**systematic bias.**" It had a big impact on me. Of course, I had read [Herbert] Simon's work about **bounded rationality**. But while Simon won the Nobel Prize for that work, I think it's fair to say he had little impact on economics. And the reason is, he had bounded rationality, but he didn't have systematic bias.

So people like Gary Becker would say, "Oh, fine, we'll just add an error term and we're done." I think Simon got frustrated talking to economists, so he went into artificial intelligence. He was a real Renaissance man. He did all kinds of things. But arguing with economists, he didn't enjoy that.

Perhaps it was because he didn't have a ready answer to the question: How does a boundedly rational agent differ, predictably, from a fully rational or hyperrational agent? ("Hyperrational" didn't exist yet, but it's where the field was going.) The first thing I got from K&T was this meta-idea that there could be predictable bias. And, essentially, my list was systematic ways that people deviated from the classical model.

Region: Which explains the transition.

Thaler: Right. I went to Stanford for that year. I begged and pleaded with anyone I could find at Stanford who could give me a job for a year. Finally, Victor Fuchs, the great health economist, took me under his very tall wing—he's about 6′6″—and put me on his grant. Originally, it was just for the fall semester, but then I sweet-talked him into a longer stay.

I spent that year out there with Kahneman just up the hill at the Center for Advanced Study in the Behavioral Sciences and Tversky down on campus in the psychology department. I took a course from him, Tversky, but spent hundreds of hours talking to both of them and taking walks with them. They didn't know anything about economics. I didn't know anything about psychology, so there were gains from trade. And so it was really that year, '77-'78, that I decided, all right, I'm going to do this.

But my first paper on this doesn't come until 1980 because it was rejected about eight times. It only came out in an obscure journal, *Journal of Economic Behavior and Organization*, in its first issue.

Then I was working on the self-control stuff with Shefrin. That we got into the *JPE*, but only after a big, big fight. It's one of two early papers I have in the *JPE* that are the last paper in the issue. I don't think it was an accident that they were last. The lead article is not an accident and at least in my case, I think, being the last article was not an accident. I always coded it as "the article the editors were most embarrassed to publish."

HOMO ECONOMICUS VERSUS HOMO SAPIENS

Region: It's hard to summarize the field, but you've written that there are three characteristics that differentiate Homo economicus from Homo sapiens: bounded rationality, bounded self-interest and bounded self-control.

Thaler: Those are the three things that—in the terminology Cass Sunstein and I use in our book ***Nudge***—distinguish humans from "econs," short for Homo economicus. But I've now added a fourth "bound" that we also need in order to have behavioral economics: bounded markets.

Region: That addition to the list leads well to my question. When we interviewed Gary Becker [see the June 2002 *Region* online at minneapolisfed.org] 11 years ago, he said, "In some sense, I'm a behavioral economist. I believe in the endowment effect, for example." But he argued that once you get into a market economy, some of these behaviors may not endure.

Here's the direct quote: "Behavior demonstrated in a lab experiment is not necessarily important in the marketplace. Generally, I am dubious about behavior that won't survive in an exchange economy with extensive division of labor."

Thaler: Right.

Region: What would you say to that logic, that markets essentially compensate for the irrational behavior of humans? Or that behavior that occurs at the individual or small group level can't persist in a market economy with trade and competition? At that scale, don't we all basically evolve into Homo economicus?

The biggest surprise about behavioral economics is that the subfield where behavioral has had the biggest impact is finance, essentially because the stakes are really high, and you don't survive very long if you're a trader who loses money.

Thaler: Well, there are two things. Of my more recent papers, one of my favorites is about the National Football League draft. It also took a long time to get published, but finally it did come out. We have a quote from Becker in there, similar to the one you have. His quote appeared in a University of Chicago magazine article about me. It says something like, "It doesn't matter if 90 percent of the people can't do the complex analysis required to calculate probabilities. The 10 percent of people who can will be in the jobs where it's required."

So, this paper is about the behavior of the owners of National Football League teams that are worth $1 billion each. And it's about the very highly paid people they hire. We find that prices for those players are way off relative to their value to the team.

Region: Meaning that people with great incentive to make smart financial decisions, and the resources to do so, are making irrational choices—pricing decisions inconsistent with the evidence.

Thaler: And even more to the point are papers that I, since 1985, and other economists have been writing about financial markets. If Gary's right, that field—behavioral finance—shouldn't exist. The biggest surprise about behavioral economics, I think, looking back on it all, is that the subfield where behavioral has had the biggest impact is finance.

If you had asked me in 1980 to say which field do you think you have your best shot at affecting, finance would have been the least likely, essentially because of the arguments that Becker's making: The stakes are really high, and you don't survive very long if you're a trader who loses money.

But for me, of course, that was exactly the attraction of studying finance, and I got into it because I had a graduate student who wanted to do finance, Werner De Bondt.

STOCK MARKET VALUATION

Region: Let's jump to that. I wanted to ask about your research on stock markets. You did papers with De Bondt in the mid- to late-1980s, I think.

Thaler: '85 and '87, and '90.

Region: And you found that investors overreacted to both good and bad news; also, they were overconfident in their investing ability. The implication was that market prices weren't always right. In other words, markets weren't necessarily efficient, in contradiction to the **efficient market hypothesis (EMH).** Then in 2001, with Owen Lamont, you studied **equity carve-outs** and found more evidence that markets aren't good at estimating fundamental value.

Thaler: Yes. Those papers highlight the two aspects of the efficient market hypothesis that I sometimes call the "no free lunch" part and the "price is right" part.

De Bondt and Thaler, "Does the Stock Market Overreact?" was about the no-free-lunch argument. When we were writing that paper in the early '80s, it was generally thought by economists that the one thing we knew for sure is that you can't predict future stock prices from past stock prices.

Region: **Random walk theory.**

Thaler: Right: It's a random walk. And so, we set out to predict an anomaly. Now, my buddy, Gene Fama [see the December

This first tenet of his [Eugene Fama's] efficient markets hypothesis is that you can't predict the future from the past. Werner [De Bondt] and I thought we should look at this. We knew that low *P/E* [price/earnings] stocks purportedly did well. We thought, well, suppose this outperformance is overreaction. A first principle of asset pricing is that equity cannot have negative value, but in this case it did! My argument is: If the market can't get that right, why should we think that when the Nasdaq is at 5,000 and then 18 months later it's at 1,400, that the 5,000 wasn't a bubble?

2007 *Region* online at minneapolisfed.org], who I regularly played golf with …

Region: His office is close by, isn't it? Nearly your next-door neighbor, but your polar opposite in theory?

Thaler: Yes, he has exactly the same office on the west side of the building. And we're both rational because he's an early morning person and I'm not, so the early morning sun doesn't bother me because I'm never here, and the afternoon sun doesn't bother him because he's on the golf course or wind surfing. In the old building, his office was directly above mine.

So, this first tenet of his efficient market hypothesis is that you can't predict the future from the past. Werner and I thought we should look at this. We knew there was some research indicating that value stocks outperform, and Benjamin Graham had been writing about this for years, but the research on this wasn't based on very good data. Not until CRSP came along, the Chicago Research on Security Prices, were good data available. Until that existed, it was hard to do rigorous asset pricing research. But there was this old tradition of value investing, and we knew that low *P/E* [price/earnings] stocks purportedly did well.

Region: That was the essential thrust of Graham's *The Intelligent Investor*?

Thaler: Yes, exactly. Now, academic financial economists were not very impressed with this finding, and part of it is that the denominator, the *E*, was calculated by accountants, and who knows what's in there?

So we thought, well, suppose this outperformance is overreaction. High *P/E* stocks, their prices go up; the prices of the Apples and Googles of the world have gone way up. But low *P/E* stocks, value stocks, their prices have gone way down.

Suppose those price movements are overreaction to something. And we thought, well, if that's true, if investors overreact, then in the extremes we should observe mean reversion. We observe mean reversion in everything else in life. Very tall fathers have shorter kids, right? But, the EMH says that we shouldn't observe it in the stock market …

Region: If prices reflect available information; if the market's efficient.

Thaler: If it's efficient, right. So, we constructed the simplest possible experiment of ranking the biggest winners and the biggest losers and seeing what happened.

Region: So that paper questioned the "price is right" tenet of the efficient market hypothesis?

Thaler: No, that's looking at "you can't beat the market."

Region: Ah, "no free lunch."

Thaler: Right: "No free lunch." It's not questioning the "price is right" aspect because … and you know, Bob Shiller [econ.yale.edu/~shiller/] has this great line in one of his early papers to the effect that if you see a random walk, concluding from that that prices are rational is the greatest error in the history of economic thought. Why? Because it could be a drunken walk. A drunken man will have a random walk and it's not rational.

So that research with De Bondt was an attack on the unpredictability, the idea that market movements are purely random. The paper with Owen Lamont and an earlier one in 1991 with Charles Lee and Andrei Schleifer on closed-end mutual funds are both an attack on this second tenet: the "price is right."

Closed-end funds are interesting because unlike the usual so-called open-end funds, an investor cannot simply send in more money and buy more of the assets the fund holds. Instead, the shares of the funds trade themselves, and the anomaly (that many had written about before) is that the prices for these shares often differ from the value of the underlying assets, the "net asset value."

Others had written about this, as far back as Benjamin Graham, but we showed that the discounts on closed-end funds seemed to be a measure of individual investor sentiment. This caused quite a stir, resulting in a four-part debate in the *Journal of Finance* with Merton Miller and two of his graduate students.

Region: So then, with Lamont, you looked at equity carve-outs.

Thaler: Yes, the Palm/3Com story …

Region: A great story.

Thaler: Yes, a great story. And as with closed-end funds, it's looking at the "price is right" aspect of the efficient market hypothesis. The brief version of the story is this: 3Com owned Palm, maker of the then-sexy Palm Pilot. They decided to spin off Palm via an IPO.

But they sold only about 5 percent of the share value of Palm. The rest of the shares were to be distributed to 3Com shareholders, and each share of 3Com would include 1.5 shares of Palm. The point of the paper is that while we can't tell you exactly what the right price is for 3Com, we can say for sure that if 3Com shares include 1.5 shares of Palm, then 3Com has to be worth at least 1.5 Palm.

And it wasn't. On the first day after the Palm IPO, the "stub value" of 3Com—that is, its value after subtracting the implicit value of its Palm holdings—was minus $23 billion. A first principle of asset pricing is that equity cannot have negative value, but in this case it did!

Owen's a great guy; we had a lot of fun writing that paper. And when we presented that paper here in Chicago's finance workshop, Gene and I got into a debate about icebergs. I was saying that this was just the tip of the iceberg—that the market was full of such mispricing—and Gene was saying this was the whole iceberg—that for the most part, markets get it right.

His argument was: Look, you have closed-end funds, you have Palm and 3Com. These are cute little examples, but there were very few shares of Palm floated. And he had a point. There was a grad student here who was spending all his time trying to borrow shares of Palm to short. Every time he was able to borrow some Palm shares to sell short, he would buy an appropriate number of 3Com shares to complete the hedge. In the end, he made about $100,000 and bought a very fancy M3 convertible that he called his "Palmmobile." So Gene is right: You could make $100,000 off this; not $100 million.

But my argument is that these things like Palm and 3Com, and closed-end funds—and Royal Dutch/Shell is another one—are significant precisely because we can test whether prices are right. I call these the "fruit flies of finance." And my argument is: Look, if the market can't get it right that 3Com has to be worth at least 1.5 Palm, or in the Royal Dutch/Shell case, which also was a 1.5 ratio, back in those days when they traded separately, Royal Dutch had to trade for 1.5 Shell. So I said: If the market can't get that right, where all you have to do is multiply by 1.5, why should we think that when the Nasdaq is at 5,000 and then 18 months later it's at 1,400, that the 5,000 wasn't a bubble?

THE EMH TODAY

Region: Those studies of yours, with Lamont and earlier with De Bondt, helped economists understand market crashes and bubbles because they were published around the times of several market crashes, in '87, '89 and 2000. We just had another financial crisis. We're still trying to learn about its causes and the lessons. What are your thoughts about the EMH today, given the recent financial crisis?

Thaler: Well, I think it's very hard to argue that real estate prices in Phoenix, Las Vegas and south Florida were rational at the peak. Now, Gene will say, correctly, that neither I nor anyone else was able to say when that bubble would break. (I'm not allowed to use the word "bubble" when I'm with Gene.)

And that's true. Even for my friend Bob Shiller. He correctly predicted the Nasdaq crash and the housing crash. But in both cases, he was about three years early. That makes him very wise, but not very helpful to an investor, because if you shorted the Nasdaq in 1996, when he gave his irrational exuberance talk to Greenspan, you were in trouble. Any hedge fund that shorted tech stocks in '96 went belly up.

So when Gene and I have these arguments, he'll say the fact that you can't predict when they will end means you can't say anything about them. I say, no, that's not the case. And that's why I separate these two aspects of the efficient markets argument: Whether you can get rich (the "no-free-lunch" part) and whether the "price is right."

It's hard to get rich because even though I thought Scottsdale real estate was overpriced, there was no way to short it. Even if there were a way—Shiller tried to create markets in that, so that you could have shorted it—you might have gone broke before you were right.

It's very hard to accept that markets always get prices right. The Internet has wildly exceeded our expectations, but the Nasdaq has still not gotten close to where it was in 2000. So I think it's pretty obvious that market was overheated, just like the Las Vegas and Phoenix real estate markets were, but you couldn't say necessarily when it was going to end.

But I think of these two components. Gene will always say the "you can't beat the market" part is the more important part. Now, I don't know whether that's self-serving or whether that's what he believes.

Region: Self-serving in the sense that it's the theory behind his passive-investing mutual fund, **DFA?**

Thaler: Well, no, that's not really what I mean. First of all, whether DFA is purely passive or not is open to question. You know, they buy small-value stocks and they add a little momentum. Now, how is that different from what **LSV** does?

But, the point is, **Mike Jensen's thesis** still holds, that most active managers underperform the market. So, I think Gene and I would give similar advice to people, which would be to buy index funds. Or invest in the [mutual fund] companies that **each of us** is associated with.

He would claim his are index funds, and I won't quibble with him in print about that. I think it's hard to beat the market. Nobody thinks it's easy, and so that part of the hypothesis is truer, but if we look at what happened to Nasdaq in 2000, and then the recent crash, well, of course, we've never gotten back to 5,000. So it's very hard to accept that markets always get prices right.

Can we say that the Internet has disappointed us since 2000? I mean, did we ever think we would be carrying around anything like this [smart phone] in our pockets? If anything, the Internet has wildly exceeded our expectations, but the Nasdaq has still not gotten close to where it was in 2000. So I think it's pretty obvious that market was overheated, just like the Las Vegas and Phoenix real estate markets were, but you couldn't say necessarily when it was going to end.

CAN MACHINES HELP?

Region: Could minimizing the human element increase market efficiency? There's

The programs are only as good as the programmers and as long as the programs are written by humans, there is a danger. Take quantitative models, quantitative investing strategies [for example]. If everybody crunches the data, they're all going to find the same patterns. I think we can improve things by making it systematic, but there are still going to be humans.

been a rapid rise in program trading, big data and machine learning in recent years. Can they decrease market irrationality by reducing the role of humans?

Thaler: Maybe. Maybe. But they also can cause trouble. The flash crash was not humans. You know, the programs are only as good as the programmers and as long as the programs are written by humans, there is a danger.

Take quantitative models, quantitative investing strategies. I think what we've learned—especially in the last five years or so—is there's essentially one quantitative model. Each hedge fund has its own proprietary model, but there was a week in August 2007 where every hedge fund was having these 10 sigma days, meaning that things were happening that would be expected to happen once every million years or so, and they were all calling each other up, "Is this happening to you?"

You know, you'd have a hedge fund that had 100 long positions and 100 short positions, and 80 of their longs went down and 80 of their shorts went up. That can't happen unless they're all doing the same thing and there's some exogenous event.

If you ask **LTCM** guys what their biggest mistake was, they'll all tell you the same thing. It was in not appreciating the fact that their bets were more correlated than they realized. Simply the fact that they were interested in these two particular bets meant they were correlated because they're not the only smart guys in the world.

Region: Groupthink?

Thaler: It's not so much groupthink because they're not talking to each other, but they have the same way of thinking. So, they've all got some bet on Russian bonds and then Russia defaults on the one they're long and not on the one they're short. And then they've all got this bet over here on Royal Dutch/Shell converging.

Region: So it's not groupthink but rather a herd mentality of a very specific herd.

Thaler: Yes. If everybody crunches the data, they're all going to find the same patterns. They'll be a little bit different, but lots of people—and LTCM was included in this—are betting on some kind of convergence.

It could be a typical merger, and doing a bit of arbitrage. You're betting that if the thing goes through, it's going to be $40 a share. It's now $38. You're making a bet that this merger will happen, and so you'll make a little bit of money unless the deal blows up. But everybody [in this part of the investment community] has really looked at this as well. I mean, nobody is trying to find stocks that are too expensive in order to buy them.

It is the case that if you turn decision-making over to a model, it will be more reliable and you can eliminate some human judgment errors. I think it's probably a better way of picking students than through doing interviews, for example, though I've never been able to convince any school where I was a faculty member that they should do that.

Region: And perhaps a better method for hiring athletes, too.

Thaler: Yes, the same for athletes, right. We did some work for one of the NFL teams and asked them, "Do you know who your best scouts are?" They said, "Oh, yeah, we know." Then we were getting a tour of their facilities. We saw a whole wall of file cabinets in the scouting department and asked, "What's in there?" "Scouting reports." "Have you ever coded those?" "No."

We convinced them to hire an intern to plug in the data, and then we had all the senior people predict who the best scouts were. They all were very confident that they knew, and it was probably heavily weighted on this guy who scouted some superstar.

It turned out that their best scout was somebody none of them had picked. It was a guy who never went on any of these trips. He just watched tape [of games].

That's all he did. He watched tape and he was very analytical.

Region: The ***Moneyball*** guy.

Thaler: Exactly. So I think we can improve things by making it systematic, but …

Region: There are still going to be managers—in finance, academia and sports.

Thaler: Yeah. There are still going to be humans. Think about what's going on right now, where we're all staring at a secular interest rate increase. We all know it's going to happen. We don't know when it's going to start, but you know if you took a poll of economists on what the 10-year bond yield will be 10 years from now, no one thinks that it will be a number that starts with a 2. Maybe it'll be a 5, 6 or 4, but it won't be a 2. But what to do about it?

A ROLE FOR CENTRAL BANKS?

Region: Is there a role for central banks, including the Fed, in addressing asset bubbles like these?

Thaler: I think there could be a role for policy. I don't know if it's the central bank. Here's something I could get behind: raising lending requirements in frothy markets.

Region: So, Fannie Mae.

Thaler: Fannie Mae, yes. If normally you can get a loan with 5 percent down, if the price-to-rental ratio exceeds *X*, raise the down payment requirement.

Region: Then a role for regulation, but not the central bank.

Thaler: I'm not one to blame Alan Greenspan for the tech bubble. I don't think that you can blame the Fed for that. There's more of a story for the real estate bubble. Certainly low interest rates helped, but …

I'm not one to blame Alan Greenspan for the tech bubble. There's more of a story for the real estate bubble. But I wouldn't put the Fed at the top of the list. Mortgage-backed securities looked like a steal. Well, that's private sector, right? You can have an open bar, but it doesn't mean everybody has to get drunk.

Region: So did lending standards.

Thaler: Right. There's so much blame to hand around—I wouldn't put the Fed at the top of the list. In Greenspan's *mea culpa* speech, he says he's shocked that there wasn't enough attention paid to, for example, counterparty risk. And that mortgage-backed securities looked like a steal. Well, that's private sector, right? You can have an open bar, but it doesn't mean everybody has to get drunk.

"NUDGING" IN THE U.K. AND ELSEWHERE

Region: I'd like to talk about your book, *Nudge*, but maybe we can talk about nudging in terms of current policy too.

Thaler: Yes, why don't we talk about nudging and what's happening now?

Region: Specifically, I hope to hear about the U.K.

Thaler: Sure, in fact, I was in London last week.

Region: You told me you'd be there, and I wondered if you were consulting with the government's policy group, the Behavioral Insight Team, also known as the Nudge Unit.

Thaler: Yes, I was.

Region: Also, I wanted to learn if you've done anything similar in the United States, perhaps with the Consumer Financial Protection Bureau [CFPB].

Thaler: The answer to that last question is yes, a little bit. But first, the U.K. story is that when *Nudge* first came out, a young guy on [future Prime Minister] David Cameron's small team—they were out of power at that time—read the book. He gave it to [future Chancellor of the Exchequer] George Osborne and David Cameron, and then Cameron assigned it to all the Tory MPs for summer reading. I don't know how many of them read it.

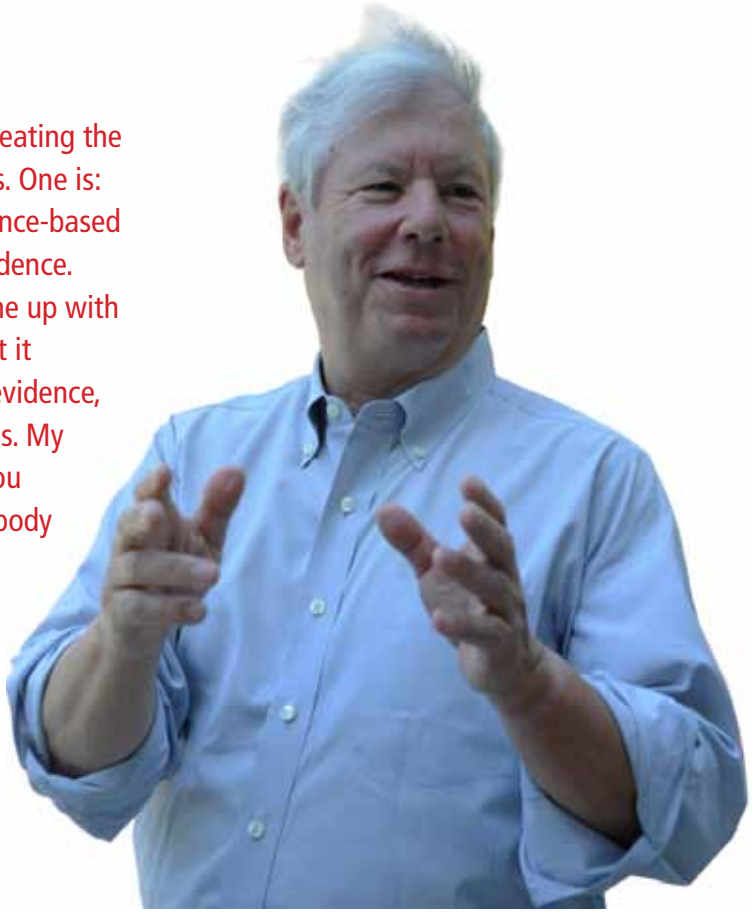
Region: Its Amazon rating must have soared at that point.

Thaler: Right—sure. Well, it was publicly reported that he had done this, so we did sell some books, but I don't know how many were actually bought by Tory MPs. Lots of them have read it now, I know. But when Cameron and Osborne were running, part of their campaign was that they were going to do this.

Then when they got elected, they said, "OK, we *are* going to do this." I was involved in helping to create this team and thinking about what it should do. And since it's been going, I've signed up to do a week of teaching in our [the University of Chicago's Booth School of Business] London executive MBA program every year. That's what I was doing last week. In the afternoon, I was teaching and in the morning, I was nudging. It's about the most fun an academic can have.

Region: Designing policy?

Thaler: Yes, but really, it's just problem-solving. A typical meeting is that I'll go with one or two team members and we'll meet with some minister and a couple of their staff, and they say, "OK, we have this problem." And we say, "OK, tell us about it." One of the very first meetings, we go see a guy in Treasury whose job is to collect from people who owe on their



I found myself repeating the same two mantras. One is: We can't do evidence-based policy without evidence. Whenever we come up with some idea, we test it because without evidence, all they are is ideas. My other mantra: If you want to get somebody to do something, make it easy.

taxes. Now, he had already been working with a firm that is affiliated with a psychologist named Robert Cialdini, a famous guy who wrote a book called *Influence: The Psychology of Persuasion.*

We said, "All right, what do you do?" Most people in the U.K. have a very simple tax situation. No deductions. If you have the equivalent of our W-2 income, you don't even file a return, but if you have Schedule C income or you're a small-business person, then you have to file a tax return and you might have to write a big check.

It's those people that his job was to collect from, and we said, "What do you do?" "Well, we send a letter and if they don't reply, we send a meaner letter. And if they don't reply to that, we send the bailiff, and that costs a lot of money." We asked, "Can we see the letter?" "Sure." "OK, I think we can do better."

In every one of these meetings in the early days, I found myself repeating the same two things; they've since become the team mantras. One is: We can't do evidence-based policy without evidence. Whenever we come up with some idea, we test it because without evidence, all they are is ideas.

For the tax collection problem, the team wrote lots of different letters. We had psychological reasons to think that these would work, but we're not always right. So, we were running randomized trials. There were lots of skeptics about this thing, you know. "Yeah, you're going to nudge. Right." But this just turned that all around.

Running the experiment itself saved the government millions of pounds because the best letter brings in about 5 percent more money than the letter they were sending out, and it doesn't cost any more to send a good letter than a bad letter. And the public is happier because the new letters are a little nicer. It was a big win.

Region: What do the letters say? How do they nudge people in the right direction?

Thaler: Basically, they say, "You know, most people pay their taxes on time." That helps. Or tailored to the individual, like, say, for you: "Most people in Minneapolis pay their taxes on time." That helps more. Or you write, "Most people in Minneapolis pay their taxes on time, and some of the money has gone to fixing all these bridges that are falling into rivers." That local specificity will do it.

Let me tell you another story about the U.K. We had a meeting with the minister in charge of a program to encourage people to insulate their attics, which they call "lofts"—I had to learn that. Now, any rational economic agent will have already insulated their attic because the payback is about one year. It's a no-brainer. But a third of the attics there are uninsulated. The government had a program to subsidize insulation and the takeup was only 1 percent.

The ministry comes to us and says, "We have this program, but no one's using it." They came to us because they had first gone to the PM or whomever and said, "We need to increase the subsidy."

You know, economists have one tool, a hammer, and so they hammer. You want to get people to do something? Change the price. Based on theory, that's the only advice economists can give.

Region: Standard price theory.

Thaler: Right, exactly. So we sent some team members to talk to homeowners with uninsulated attics. "How come you don't have insulation in your attic?" They answered, "You know how much stuff we have up there!?"

So, we got one of the retailers, their equivalent of Home Depot, that are actually doing the [insulation] work, to offer a program at cost. They charge people, say, $300; they send two people who bring all the stuff out of the attic. They help the homeowners sort it into three piles: throw away, give to charity, put back in the attic. And while they're doing this, the other guys are putting in the insulation.

You know what happened? Up to a 500 percent increase.

So, that's my other mantra. If you want to get somebody to do something, make it easy. Anyway, I could give you a hundred of those stories.

Region: They're great.

Thaler: So, you asked if there is anything similar in the U.S. There is a little. Something has started on a very small scale.

Region: Through the CFPB?

Thaler: No. I mean, the CFPB is doing some behaviorally motivated research. But there are also the beginnings of an equivalent to Britain's Behavioral Insight Team. It's an initiative led and coordinated by the Office of Science and Technology Policy, and it's just starting up. There's one energetic young woman, Maya Shankar, who's getting this started and it's going to be on a very small scale initially. We'll see if they have success and, if so, it will probably grow. We've shown that this kind of effort saves tons of money.

RECIPROCITY AND COOPERATION

Region: One thing we haven't talked about yet is your work on reciprocity and cooperation. And let's use another British example, Golden Balls [goldenballstvshow.com/]. You did some fascinating research on this British game show. Can you tell that story and what it illustrated?

Thaler: You know, it's funny, this goes back to Gary's line [about behavior in real markets as opposed to labs]. As you know, this game show ends in a prisoner's dilemma. And there have been thousands of experiments run on one-shot prisoner's dilemmas. We know that economic theory says that the rational strategy is to defect; theory says everyone will defect. It's the dominant strategy.

In experiments, about 40 to 50 percent of the people cooperate, but it involves small stakes. In this paper we write about the actual game show, there's one trial, a round in the actual game show—you may have seen the clip [youtube.com/watch?v=p3Uos2fzIJ0] of it—where it's not small stakes at all; it's around 100,000 pounds. And that's one of the things we were interested in: What happens when you raise the stakes?

This is what happens: You get a plot like this (see hand-drawn plot on page 25 and actual plot above). I just happened to have drawn this for another visitor, a grad student.

So, yes, the economists were right. If you raise the stakes, cooperation falls. But it falls to the same level you see in the lab. The interesting behavioral thing is, when the stakes are small, compared to what other people are playing for in the game show, then cooperation gets even higher.

This goes to bounded self-interest. Economists assume people are unboundedly unscrupulous—or I'll say self-interested, a more polite term. But there have been lots of experiments where you leave a wallet out and depending on the place—I don't remember the exact data—but a large percentage get returned. Now, some wallets also get picked clean first, but … so I wrote about this too. (He displays a photo of a roadside rhubarb stand.)

Region: What is this?

Thaler: This is significant. Notice the features of this. It's a roadside stand; they're selling rhubarb. And it's got an honor box with a lock on it.

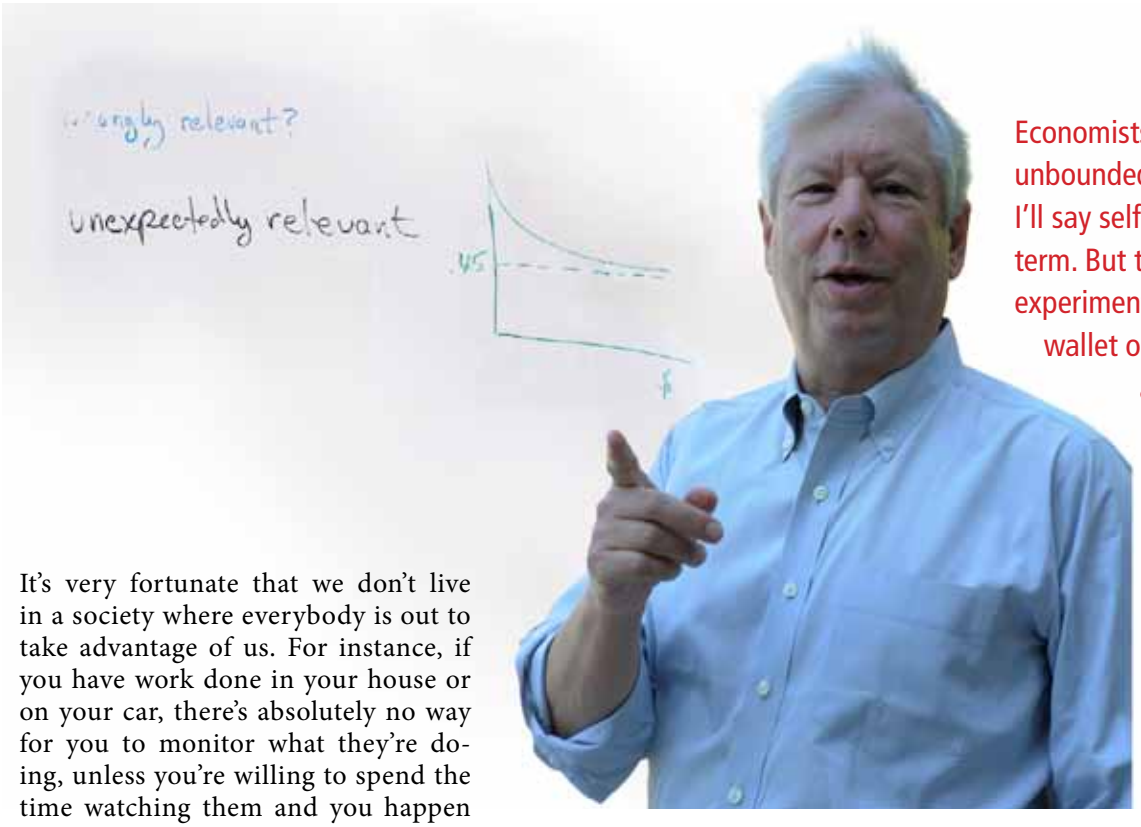
I think this is exactly the right model of human nature, that if you put this stuff out there, enough people will leave money that it's worth the farmer's time to put it out. But if you left the money in a box that was unlocked, somebody would take it.

Region: It takes just one dishonest person to "undo" the honesty of many others …

Thaler: Right. If you ask somebody directions, most people will tell you.

This figure displays the relative frequency of contestants who decide to "split" the stake in "Golden Balls," a British game show. The dashed line reflects the average cooperation rate. The solid line connects the average estimate of propensity to cooperate for each stake size interval.

Source: "Split or Steal? Cooperative Behavior When the Stakes Are Large," p.18



Economists assume people are unboundedly unscrupulous—or I'll say self-interested, a more polite term. But there have been lots of experiments where you leave a wallet out and a large percentage get returned. It's very fortunate that we don't live in a society where everybody is out to take advantage of us.

It's very fortunate that we don't live in a society where everybody is out to take advantage of us. For instance, if you have work done in your house or on your car, there's absolutely no way for you to monitor what they're doing, unless you're willing to spend the time watching them and you happen to know a lot about the work, materials and methods being used.

So it has to involve trust. Trust is really important in society, and anything we can do to increase trust is worthwhile. There's probably nothing you could do to help an economy grow faster than to increase the amount of trust in society.

EVOLUTION OF ECONOMICS

Region: Let me end with another evolutionary question, about the evolution of economics. In a 1999 article in *Financial Analysts Journal*, you predicted that behavioral finance would no longer be a subfield of financial economics, but simply a fundamental. And in a parallel 2000 piece in the *Journal of Economic Perspectives*, you forecast much the same for behavioral economics in general. How are you feeling now about those predictions, about 12 or 13 years hence?

Thaler: Good.

Region: How so? Because of progress in economic science?

Thaler: Well, you know, somebody once said science proceeds funeral by funeral.

Region: Right. Kuhn?

Thaler: I don't think it's Kuhn. I think it may be Max Planck, but it's a Kuhnian thought. He probably quotes it. And it applies here. The field of behavioral economics has really been driven by the entry of young people. We've had these biannual behavioral economics summer camps sponsored by the Russell Sage Foundation. We just had our 10th camp, so we've been doing it for 20 years. And now the CFPB academic advisory board includes me and four former campers: These are chaired professors at Harvard, Yale, et cetera.

But if I would give one example to illustrate where I think the field is going, I would point to Raj Chetty, who should be on your list of people to interview. As you know, he just won the Clark Medal, at 33.

Now, Raj would not describe himself as a behavioral economist, but much of his best work is as behavioral as it should be. One of his most recent papers [obs.rc.fas.harvard.edu/chetty/ret_savings.html] is addressing a question I've been asked for the last 20 years, which is, if I get people to save more in their 401(k) plans, how do I know that they're just not running up bigger credit card bills? And the answer is, I don't know because I don't have their balance sheets.

Raj and his co-authors got data from Denmark, where they know everything. It turns out that 90 percent of the saving is new and that the automatic features do all the work. The tax subsidy is only affecting the behavior of rich people.

Region: So changing the choice architecture accounts for that change in participation.

Thaler: The choice architecture is everything. The tax subsidy is nothing.

Region: That's refuting price theory, sir.

Thaler: I'm sorry. I still believe in supply and demand, you'll be happy to know.

Region: That is reassuring. And a good place to close. Thank you very much. R

—Douglas Clement
July 17, 2013

More About Richard Thaler

Current Positions

Ralph and Dorothy Keller Distinguished Service Professor of Behavioral Science and Economics, Booth School of Business, University of Chicago; Director, Center for Decision Research; on faculty since 1995

Research Associate, National Bureau of Economic Research; Co-director (with Robert Shiller), Behavioral Economics Project, since 1992

Previous Positions

Fellow, Center for Advanced Study in the Behavioral Sciences, Stanford University, 1998

Henrietta Johnson Louis Professor of Economics, Johnson Graduate School of Management, Cornell University; Director, Center for Behavioral Economics and Decision Research, 1988-95

Visiting Professor, Sloan School of Management, Massachusetts Institute of Technology, 1994-95; Visiting Scholar, 1993

Visiting Scholar, Russell Sage Foundation, New York, 1991-92

Visiting Associate Professor, Policy Division, Faculty of Commerce and Business Administration, University of British Columbia, 1984-85

Professional Activities

President-elect, American Economic Association, 2014; Vice President, 2010; Nominating Committee, 2004, 2011; Member since 1970

Associate Editor: *Journal of Behavioral Decision Making, Journal of Risk and Uncertainty, Management Science*

Honors

Honors Member, American Academy of Arts and Sciences, since 2000

Nicholas Molodovsky Award, CFA Institute, for "groundbreaking research in the fields of behavioral economics and finance," 2012

Fellow, Econometric Society, 2012

Honorary Ph.D., University of Rochester, 2010; Erasmus University Rotterdam, 2005; Case Western University, 2003

Fellow, American Finance Association, 2009

Publications

Co-author (with Cass R. Sunstein) of the bestseller *Nudge: Improving Decisions about Health, Wealth and Happiness* (Yale University Press, 2008); author of The *Winner's Curse: Paradoxes and Anomalies of Economic Life* (Free Press, 1991) and *Quasi-Rational Economics* (Russell Sage Foundation, 1991); editor of *Advances in Behavioral Finance* (vol. I, Russell Sage Foundation, 1993; vol. II, Princeton University Press, 2005); author of numerous articles in prominent journals with an emphasis on behavioral economics and the psychology of decision making.

Education

University of Rochester, Ph.D., 1974; M.A., 1970

Case Western Reserve University, B.A., 1967

Glossary

Anomalies
The title of a column in the *Journal of Economic Perspectives* in which Thaler and other economists have analyzed economic behaviors that appear to contradict the predictions of expected utility theory. For Thaler contributions, see faculty.chicagobooth.edu/Richard.Thaler/research/anomalies.html.

Anchoring
Relying on the first piece of information received when making decisions and judgments. The initial information becomes the reference point (or "anchor") for subsequent deliberation, as when negotiations start with a specific dollar figure that becomes the amount from which buyer and seller seek to bargain.

Availability heuristic
A mental shortcut whereby individuals judge probabilities and frequencies by the ease of recalling examples. Psychologists and behavioral economists suggest that humans use this strategy to simplify the difficulty of calculating probabilities, deciding that if an event or characteristic is easily remembered, it likely occurs frequently. As Kahneman and Tversky wrote in their 1973 paper on this heuristic, "A person could estimate the … likelihood of an event, or the frequency of co-occurrences by assessing the ease with which the relevant mental operation of retrieval, construction, or association can be carried out."

Bounded rationality
The term used by economist Herbert Simon to describe the limited capacity of humans to think and act in fully rational ways, thereby limiting their ability to optimize as posited in conventional economic theory. Bounds include incomplete information, inability to process information without bias or error, and restricted time in which to make decisions and judgments. Simon argued that although individuals may intend to make rational decisions, these limits result in their "satisficing" instead of optimizing—that is, making the most adequate or satisfactory decisions given bounded rationality.

DFA
Eugene Fama is a board member of Dimensional Fund Advisors, dfaus.com, whose philosophy, in part, is that "markets reflect the vast, complex network of information, expectations, and human behavior. These forces drive prices to fair value." DFA, in other words, holds an investing philosophy based on the EMH.

"Each of us"
As noted above, Eugene Fama is a board member at Dimensional Fund Advisors, or DFA. Thaler is a board member and principal of Fuller and Thaler Asset Management Inc., fullerthaler.com. The firm uses insights from behavioral economics to find "mispriced stocks and earn superior returns."

Efficient market hypothesis
The notion that prices reflect all available information. According to Eugene Fama, one of the idea's earliest and best-known proponents, "Market efficiency [means] that the deviation of the realized price from the equilibrium expected value is unpredictable based on any past information." Since prices incorporate relevant, available information, the EMH holds that equities trade at fair value, making it impossible to use selection or timing strategies that can consistently outperform market indexes. Only by taking on additional risk can investors earn higher returns.

Equity carve-out
A partial spinoff by a parent company of a minority stake in a subsidiary. Carve-outs involve a company listing part of its operation as an initial public offering, or IPO. The parent usually continues to hold a controlling share of the subsidiary's equity for a while, thereby remaining in control of its operation.

Mike Jensen's thesis
Harvard economist Michael Jensen developed "Jensen's alpha," a risk-adjusted measure of portfolio performance that estimates how much a fund manager's forecasting ability contributes to the fund's returns. Using this measure to estimate the predictive ability of 115 mutual fund managers from 1945 to 1964, he found "not only that [they] were on average not able to predict security prices well enough to outperform a buy-the-market-and-hold policy, but also that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance." Adjusted for management fees, average fund returns didn't cover brokerage expenses.

Daniel Kahneman and Amos Tversky
Long-time collaborators who developed many of the fundamental psychological concepts behind behavioral economics. After accepting the Nobel Prize in economics in 2002 for this work, Kahneman reportedly said that he considered it a joint prize with Tversky, who had died in 1996. (The Nobel is not awarded posthumously.)

LSV
An institutional investment fund, lsvasset.com, founded by economists Josef Lakonishok, Andrei Shleifer and Robert Vishny based on research they developed in the mid-1990s, which argued that value stocks outperform growth stocks because "value strategies exploit the suboptimal behavior of the typical investor and not because these strategies are fundamentally riskier." LSV Asset's investment philosophy is that "superior long-term results can be achieved by systematically exploiting the judgmental biases and behavioral weaknesses that influence the decisions of many investors."

LTCM

Long-Term Capital Management, a prominent hedge fund that collapsed in 1998 after losing over $4.6 billion when Russia devalued its currency, essentially defaulting on its bonds—an outcome that LTCM's quantitative models had given very low probability. To prevent broader systemic failure, the Federal Reserve intervened, overseeing a $3.6 billion bailout by 14 large financial institutions. By 2000, LTCM had been liquidated and dissolved.

Moneyball

Referring to the 2003 book, *Moneyball: The Art of Winning an Unfair Game*, by Michael Lewis, about the Oakland Athletics' data-driven approach to building the best possible baseball team with a small budget.

Nudge

"Nudge: Improving Decisions About Health, Wealth, and Happiness" is a 2008 book by Cass R. Sunstein and Thaler. It discusses flaws in human decision-making, and how to improve the process through better choice architecture—that is, better organizing the context in which decisions are being considered. *Nudge* suggests government policies, corporate practices and individual measures that could be taken to improve outcomes in a variety of areas, including investing and health care. (See the December 2009 *Region* review at minneapolisfed.org.)

Random walk theory

The idea that an amount or price changes without any consistent pattern—a "random walk." Therefore, it is impossible to forecast future equity prices accurately based on prior history. Applied to shots by a basketball player or deals to a poker player, the theory is also used to refute the idea of a "hot hand."

Systematic bias

The tendency to consistently favor particular outcomes or make predictable decisions or judgments. In behavioral economics, the phrase is often used to describe the result of using cognitive shortcuts. In *Nudge*, Thaler and co-author Cass Sunstein write, "Although rules of thumb can be very helpful, their use can also lead to systematic biases." Psychologists Kahneman and Tversky are credited with first exploring this link in their 1974 article "Heuristics and Biases."

A BALANCED APPROACH MEANS
YOU SHOULD BE WILLING TO
ALLOW INFLATION
ABOVE ITS 2 PERCENT TARGET TO
FACILITATE A
FASTER
TRANSITION
OF UNEMPLOYMENT TO LOWER
MORE DESIRABLE
LONGER-RUN LEVELS

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HOW MUCH
UNEMPLOYMENT
IS CAUSED BY EACH
STRUCTURAL
FACTOR?
GENERALLY, THE ANSWER IS
NOT A LOT

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EVOLUTION
OF THE DATA HAS LED ME TO PUT
LESS WEIGHT
ON STRUCTURAL
FACTORS
THAN I DID EARLIER IN 2012

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FORWARD GUIDANCE
IS AN ATTEMPT TO USE WORDS
TODAY
TO DESCRIBE WHAT
YOUR ACTIONS
ARE LIKELY TO BE IN THE
FUTURE

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THE INFLATION THRESHOLD
I VIEW IT AS A
SAFEGUARD
A
GUARDRAIL
PROTECTION AGAINST
WHAT I SEE AS BEING AN UNLIKELY RISK OF
UNDULY HIGH INFLATION

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BETTER POLICY THROUGH BETTER COMMUNICATION

TWO CONVERSATIONS WITH
NARAYANA KOCHERLAKOTA

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I UNDERSTAND THE POSSIBLE CONFUSION
ON THE UNEMPLOYMENT THRESHOLD
IF YOU SET IT AT 5.5 PERCENT
YOU WON'T HAVE
THAT CONFUSION ANYMORE
I THINK IT'S CLEARLY
SMACK DAB
IN THE
MIDDLE
OF WHERE THE COMMITTEE SEES
THE UNEMPLOYMENT RATE SETTLING

Page 34

UNDER CURRENT CONDITIONS
WE HAVE A LOT OF
ROOM
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Research Digest

The September issue of *The Region* includes two digests, the first of recent research by Minneapolis Fed consultant Andrew Atkeson and his UCLA colleagues on the link between insolvency crises and economic recession. To understand that relationship, they develop a new method for measuring financial soundness of firms. The second digest looks at research by Minneapolis Fed economists Jonathan Heathcote and Fabrizio Perri on the efficiency with which resources are allocated globally. They find a complex, subtle relationship between economic growth and international efficiency.

Andrew Atkeson

Insolvency and recession: What's the connection?

A robust measure of financial soundness sheds light on the link between insolvency crises and recessions

It has been an article of faith that the Great Recession was intensified by the collapse or near-collapse of major U.S. firms, particularly those in the financial sector. Indeed, many economists consider corporate instability and insolvency to have played a major role in virtually all recessions. But at this point, the nature of this linkage and its actual significance are still poorly understood. Minneapolis Fed consultant Andrew Atkeson of the University of California, Los Angeles, along with his UCLA colleagues Andrea Eisfeldt and Pierre-Olivier Weill, explore the relationship in depth and over time in a recent staff report (SR 484, online at minneapolisfed.org), "Measuring the Financial Soundness of U.S. Firms, 1926-2012."

The association between recession and insolvency is thought to stem from financial frictions. When firms are financially healthy, the financial system can do its job of facilitating the constant reallocation of productive resources from shrinking to growing firms and from saving households to investing firms that is necessary to ensure that these resources are being used efficiently.

In contrast, if a large number of firms become financially unsound, or appear to be close to

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insolvency, then it becomes much more difficult for the financial system to do its job, and productive resources don't get to the firms that can make best use of them. The lack of trust and uncertainty that arise when many firms are close to insolvency impede capital flows generally and thereby amplify business cycle fluctuations.

"A contribution to measurement"

Atkeson, Eisfeldt and Weill explore this idea by first developing a measure of financial soundness valid for a broad spectrum of firms over a long period. They call their measure "distance to insolvency." Simply put, it gauges how close a given company is to being unable to pay its bills. They define DI as the "ratio of our measure of leverage to our measure of asset volatility."[1]

In essence, DI measures how much equity a company has to fall back on compared to its general risk profile. A comparable calculation for occupations would measure literally how thick a cushion a worker has relative to the risk of falling. Trapeze artists are more likely to fall than accountants; their cushion depth relative to their job risk provides a fair measure of whether or not they'll survive a slip.

The economists offer a theoretical foundation for their measure using an established model of structural credit risk. On that basis, they approximate firm DI empirically as the mathematical inverse of the volatility of each firm's equity. So a company whose stock value fluctuates widely will have a low (or short) DI; whereas, a company with more stable stock value will have a higher DI (a greater distance to insolvency).

They then validate it empirically through comparison with alternative measures of financial soundness, including credit ratings, option-based bond spreads, credit default swap rates and others. They find that their measure correlates closely with these others, "both in the cross section at a point in time and across time." In other words, DI is a reasonable measure of financial health, with results similar to other such measures.

Why then develop another gauge? "The primary advantage of our measure of DI, relative to leading alternatives," they suggest, "is that it requires only data on firms' equity volatility and hence can be computed for a very broad set of firms over a very long historical time period." While other measures rely on data collected only in recent years, or from just a few sectors of the economy, statistics on equity volatility have been gathered from many companies for many years—just what's needed for long-term assessment of U.S. corporate financial stability.

The economists say their paper is intended as a "contribution to measurement," and it is indeed that. But it goes well beyond constructing a new and widely applicable measure of financial health through a rigorous examination of several crucial questions: What is the relationship between financial soundness and recession? Which components of soundness are most important in explaining insolvency crises? Do financial and nonfinancial firms differ in terms of soundness? Can financially unhealthy firms be easily identified in advance of crisis?

Soundness and recession

Are U.S. recessions correlated with insolvency crises? This is perhaps the economists' central question, and they use their measure of DI to address it. The answer: yes and no. The largest recessions in recent U.S. history, in 1932-33, 1937 and 2008, are closely associated with crises in insolvency, but there is no systematic relationship between insolvency and other U.S. recessions between 1926 and now. Thus it appears that financial frictions did play a major role in the largest modern American recessions, but not in smaller recessions.

How important is leverage?

The economists' measure of DI allows them to distinguish between changes in firm leverage and asset

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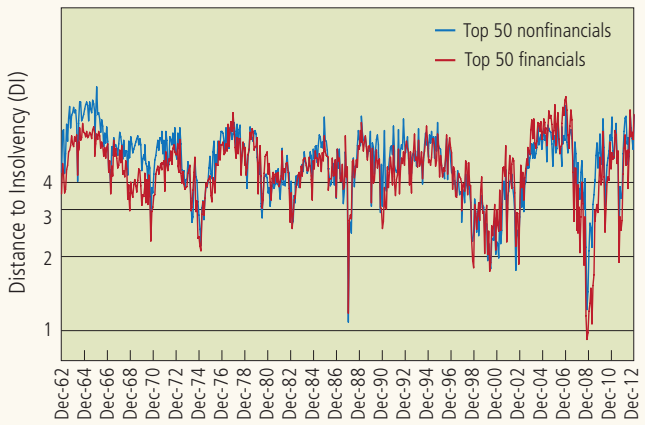

Note: This figure compares the log median distance to insolvency (DI) for the largest 50 financial and nonfinancial firms in the United States, as measured by market capitalization. Horizontal lines indicate authors' benchmark DI cutoffs on a log scale.

Source: Figure 21 in "Measuring the Financial Soundness of U.S. Firms, 1926-2012."

valuation, and thereby determine each component's relationship to insolvency crises. They find that empirically, leverage ("a drop in the equity cushion," as they define it) has played far less a role than generally assumed. Instead, changes in firm asset volatility ("an increase in business risk") seem to be the major driver. This is true during the entire period for which they have the necessary data, 1972-2012, but notably in the insolvency crisis of 2008.

Their analysis shows that "this crisis was almost entirely due to an increase in asset volatility. This finding is in contrast to common narratives in the financial press and academic literature, which emphasize the role of an increase in leverage due to a fall in asset values."

Financial and nonfinancial firms

To their last empirical question—Do financial firms differ in DI ratings from nonfinancial firms?—the economists again find a nonintuitive negative answer. The data indicate little difference. Their comparison of median DI for the 50 largest financial and nonfinancial firms, for example, indicates "virtually identical" trends from 1962 through 2012; see figure above.[2] "We find that the evolution of the distribution of financial soundness for publicly traded financial firms closely resembles that of nonfinancial firms," they conclude.

They also address the question of whether efforts to identify weak financial institutions before or during a crisis are likely to bear fruit, as policymakers have hoped—thereby providing a signal for regulators to step in. The economists are skeptical. They look at a set of large, government-backed financial institutions (GBLFIs), including the 18 bank holding companies subject to the Fed's annual stress tests and the eight large financial institutions that failed during the 2008 crisis. The DI data provide no useful warnings: "The risk that any one GBLFI is unsound compared with the others is small relative to the risk that the whole group … becomes unsound together."

—Douglas Clement

[1] They further clarify that their ratio "corresponds to the drop in asset value that would render the firm insolvent, measured in units of the firm's asset standard deviation."

[2] Atkeson notes that the actual identity of the 50 largest financial firms may not correspond to the concept of a "bank" that many people hold. The list also changes significantly over time. For the calculation illustrated in the figure, the economists chose their metric because in practice it can be hard to identify in advance of a crisis which financial firms are truly "significant"—a challenge regulators currently face. The authors' method is an objective procedure for doing so.

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PHOTOGRAPH BY MARC NORBERG

Jonathan Heathcote Fabrizio Perri

Wealth among nations

Understanding the subtle relationships between economic growth and international efficiency

Explaining the wealth of nations is a difficult problem, pioneered by Adam Smith over two centuries ago and still debated. The distribution of wealth among nations is quite another issue, less studied and perhaps less understood. In "Assessing International Efficiency," a staff report (SR 480, online at minneapolisfed.org) prepared as a chapter in the *Handbook of International Economics,* Minneapolis Fed economists Jonathan Heathcote and Fabrizio Perri reduce this imbalance with an examination of whether resources are allocated efficiently among nations.

Their question is not one of equality: It's quite obvious that not all countries have the same quantity of resources, either per capita or in total national wealth. Rather, they ask an arguably more important question: Might a different allocation of global resources improve the overall well-being of the world's population? That is, would a hypothetical redistribution among nations increase the economic welfare of people in one country (or countries) without reducing welfare elsewhere—a Pareto improvement, in the vernacular of economists? And, if so, how large are those potential welfare gains?

Thus far, economists have examined this question from two distinct angles: consumption and production. One stream of literature has tried to measure whether consumption levels are globally efficient; the other has investigated productive efficiency: Would a different international allocation of labor, capital and technology increase world output and economic well-being?

The goal of the Heathcote-Perri paper is to develop a methodology that allows assessment on both dimensions and to then apply it to gauge efficiency first broadly and then narrowly. Specifically, they assess international efficiency across

- *A broad spectrum* of the world's countries over the *long run.*
- *Advanced economies* only, over a shorter time span: the booms and busts of *business cycles.*

They caution readers that regardless of their success in developing useful assessments on either dimension, their research is limited insofar as it doesn't consider allocative efficiency within each of the world's nations, only among them.

Developing a method

The economists begin by making what they admit is a strong assumption, that people's preferences about consumption and saving are essentially the same in all countries. If not, gauging economic welfare is an impossible task, since people in

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Argentina or Algeria might measure their well-being differently than those in Malta or Zambia.

They then develop, step-by-step, a methodology for assessing international efficiency, starting with a model economy.

Step 1: Build a model

Their model economy consists of three standard elements:

- *Preferences*—for example, risk tolerance; if one nation is more risk tolerant than others, it is efficient to shift more risk toward that nation.
- *Technologies*—such as existing quantities, or "endowments," of labor, capital, factor productivity and production opportunities.
- *Frictions*—constraints caused by physical or technological features, such as difficulties importing and exporting because of a mountain range or an inability to enforce international contracts.

Step 2: Define "efficient"

Evaluating whether actual international allocations are efficient requires clarity about "efficiency" itself. The economists determine "efficient" by solving a planning problem—finding the optimal mathematical solution(s) to the set of equations that constitute the model. This baseline is essential, but the economists refine it by comparing it to the efficiency of a selection of financial market structures, such as financial autarky, limited asset trading, and complete national and international markets. By doing so, they discover which features of the data can best be used to test international efficiency and whether trading a limited set of assets can help attain efficient allocations.

Step 3: Compare model against data

With the model's structure and components in hand and a benchmark for an efficient allocation established, the economists' next step is to compare different model allocations to actual world data to see which allocation is a good fit with reality. This data comparison might involve examining GDP correlations among nations, for example, or co-movements of consumption and exchange rates, or prices or portfolios of assets in different countries.

Step 4: Assess possible gains; design policy accordingly

If given resource allocations are found not to be efficient, a central question becomes: How much could be gained by allocating resources in a more efficient way? A related question: *Why* isn't efficiency achieved? And, therefore, how could policies be designed to improve international welfare?

Applying the method to assess long-run efficiency

The methodology thus outlined by Heathcote and Perri is useful in a variety of contexts, and they demonstrate its utility with two specific applications: a long-run global assessment and a short-term, advanced-nation calculation.

The first assessment uses a well-known international database, the Penn World Tables. They look at 112 countries with continuous data over half a century, from 1960 to 2010. A glimpse at these data suggests three things: First, faster output growth doesn't translate one-for-one into faster consumption growth. Second, it does, however, translate *more* than one-for-one into faster growth in investment. Third, there seems to be little relationship between output growth and net foreign asset position (a reflection of a nation's global indebtedness).

They proceed with their multistep methodology: model, a definition of efficiency, comparisons of different model structures with data and assessment of evidence. Their overall conclusion: "The long-run allocations of consumption across countries are inefficient. … On the other hand, productive efficiency is harder to reject." Reconciling this seeming discrepancy calls for "more satisfactory positive theories of

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global imbalances," they write. "We expect the question of long-run efficiency to be revisited."

A return to the question is of more than theoretical interest. The economists run a number of scenarios of gains from improved long-term international efficiency. The benefits found in their closest approximation to the actual global economy over the past 50 years: "An expected welfare gain worth 4.8% of consumption would be an upper bound" for countries moving from autarky to a globally integrated bond market. Given that gains from eliminating business cycles are estimated at mere 0.008 percent, the gains to improved long-term efficiency are thus potentially enormous.

Efficiency over business cycles

The next application is to examine international efficiency among developed economies only, over the peaks and troughs of business cycles, a shorter time frame than viewed in their global analysis. In so doing, they use a slightly different model than earlier because they want to employ the framework to understand prior business cycle research on advanced economies; in this model, the key difference is that nations produce goods that aren't perfect substitutes for one another—certainly a plausible assumption in the short term.

The economists run a number of scenarios of gains from improved long-term international efficiency. The benefits found in their closest approximation to the actual global economy over the past 50 years: "An expected welfare gain worth 4.8% of consumption would be an upper bound" for countries moving from autarky to a globally integrated bond market.

Again, they define their model with preferences, technologies and frictions, compute efficient allocations, explore allocative efficiency under alternative market structures and then compare the efficient allocations and market allocations using data on four "observables": standard macroeconomic quantities, exchange rates, international diversification and asset prices.

In the context of advanced economies over the short term, they conclude, macro quantities and portfolio diversification seem quite possibly efficient—in contrast to some previous research and to their conclusions about long-term global allocations. But evidence on asset prices is more difficult to understand with standard models, they say. The comparison of alternative market structures indicates that "the welfare costs associated with an inefficient allocation can be significant over the business cycle," when countries experience persistent income shocks. A surprising finding in such cases is that "partial financial liberalization can lower welfare."

In sum

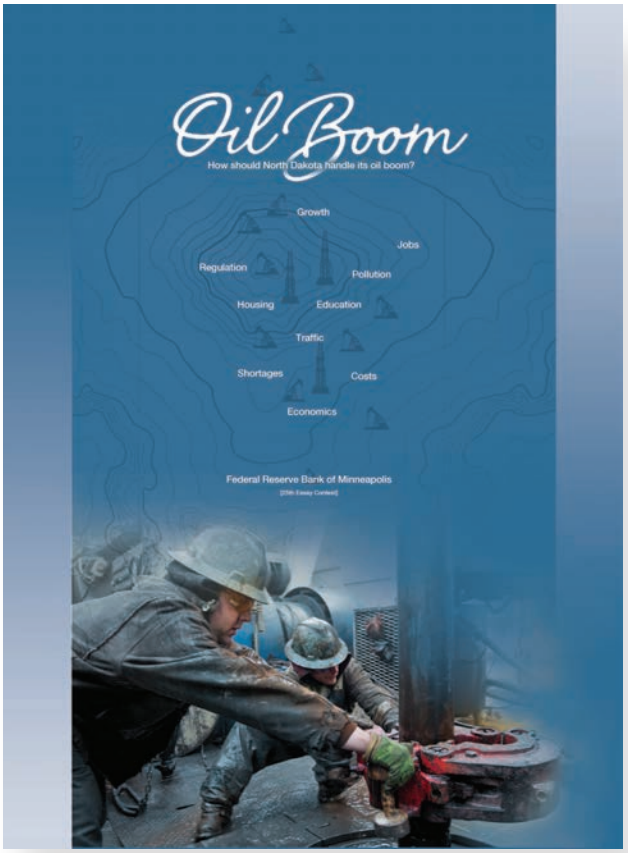
What to make of it all? The economists state two simple conclusions, among others:

- "First, over the long run, allocations appear inefficient. …This is important, because the potential welfare gains from achieving more efficient allocations in the long run are large."
- "In contrast, it is difficult to reject the hypothesis that allocations respond efficiently to business cycle frequency fluctuations."

The economists don't delve deeply into policy interventions to improve efficiency, but they do note that working to remove frictions in international financial markets might help provide insurance against country-specific shocks.

—Douglas Clement

2012–2013 Student Essay Contest
North Dakota Oil Boom



Essay Question

How should North Dakota handle its oil boom?

This spring the Minneapolis Fed held its 25th Annual Student Essay Contest, which is open to all high school students in the Ninth Federal Reserve District. The contest drew 291 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, William Thomas of Roseville Area High School in Roseville, Minn., received an additional $400 and a paid summer internship at the Minneapolis Fed.

Over the past few years, oil drilling and extraction have turned North Dakota into the nation's second-largest oil-producing state, and the one with the lowest unemployment. While this boom has been good for many, it has also raised a number of economic questions about the consequences of rapid growth and about the long-run health of the state's economy. Entrants in this year's essay contest were asked to use sound economic logic to evaluate economic issues surrounding the oil boom.

Student Essay Contest Winner

Turning the North Dakota Oil Boom into Long-Term Economic Growth

William Thomas
Roseville Area High School
Roseville, Minn.

North Dakota's current oil boom is not its first and probably will not be its last. The most recent previous boom happened in the 1980s. For a few years, oil brought marvelous wealth to the region's economy. Then oil prices declined, production stopped and oil workers departed, leaving behind ghost towns and plummeting wages (Brown 2013). Similarly, the current oil boom in western North Dakota cannot last forever. Oil prices are notoriously volatile (Karl 2007), and a significant decline in oil prices could easily remove producers' incentive to extract oil in the region because such extraction requires the process of hydraulic fracturing, or fracking, which is quite expensive compared with other methods of crude oil production (Mahon 2005). Even if oil prices continue to increase for several decades, North Dakota's oil reserves are finite: Although definitive estimates of the amount of oil in the Bakken reserves do not exist, the oil there must run out eventually. Therefore, North Dakota's oil boom must be viewed as a foundation for future growth in the region, not a permanent source of income. In order to make North Dakota's new economic growth sustainable in the long term, it is imperative that policymakers do two things with oil tax revenues: save funds so that they can be used to stimulate the economy when the boom ends, and spend money in ways that encourage economic diversification.

The greatest risk to North Dakota's long-term economic health as a result of the oil boom is a phenomenon known as "Dutch disease"—the situation that results when a natural resource industry absorbs so much labor and capital that other industries become less competitive. Then, when oil production eventually declines, those other industries are unable to create enough growth to make up for the loss of the natural resource industry. This tragedy occurred in the Netherlands (hence, the name "Dutch disease") in the 1960s: The country experienced extraordinary growth as a result of its discovery of natural gas deposits in the North Sea, but its other industries suffered, its economy became dependent on natural gas exports and its government faced enormous budget deficits when the gas deposits ran out (Ebrahimzadeh 2012). Symptoms of Dutch disease can already be seen in the communities of western North Dakota. The increase in oil production has created an astronomical amount of demand for skilled labor, and the increase in supply as people migrate to the region has not kept up. As a result, wages have skyrocketed to levels that local businesses cannot afford to pay, and many have lost employees who sought higher-paying jobs in the oilfields (Davies 2012). Thus, the oil industry's absorption of labor is harming other sectors of North Dakota's economy. When the oil boom ends, North Dakota's economy will be crippled if there are no strong industries to replace the oil industry.

One way to begin to deal with Dutch disease is to create a fund for oil tax revenues that will not be spent until oil production declines. Chile has such a system in place for its substantial copper revenues: When copper prices are high, the government saves the resulting revenue in sovereign wealth funds; when copper prices are low, the government uses the funds to finance deficit spending that stimulates the Chilean economy in order to compensate for the loss of income from the copper industry ("Chile" 2013). North Dakota's state government should implement a similar system for revenue from taxes on oil companies. It could save these revenues in a fund, and then, when oil production declines, it could spend the money to stimulate the state's economy,

helping other industries to thrive and continuing the growth that the oil boom initiated. In fact, voters have already approved a constitutional amendment that will place 30 percent of oil tax revenues in a fund called the Legacy Fund, which cannot be spent until 2017 ("North Dakota Legacy Fund" 2013). However, the conditions under which this money can be expended should be stricter; rather than setting a definite date on which the savings can be spent, the Legislature should decide not to utilize the fund until oil production declines by a specified amount. This will ensure that funds will be available to temporarily support North Dakota's economy when the oil boom eventually ends.

The state government of North Dakota should also direct spending and tax cuts toward programs that will contribute to the health of the entire state economy so that the state does not become dependent on the oil industry. Infrastructure is one such program. North Dakota's infrastructure is badly in need of improvement due to the increased traffic that has resulted from population growth and oil trucks (Manning 2013). Better infrastructure will make the area much more attractive to all types of businesses. Indeed, the Federal Reserve Bank of San Francisco has estimated that every dollar of federal highway grants that a state receives increases a state's gross product by two dollars (Madrick 2013). The state could also use some of its new oil tax revenues to provide tax relief to manufacturing companies and small businesses to help them deal with the high wages that the oil industry has brought to the state. When the oil industry leaves, it will leave a skilled workforce behind; these policies will ensure that North Dakota can continue to profit from that workforce for many years into the future. Otherwise, if those workers are unable to find employment without the oil industry, they will leave the state.

The seemingly miraculous economic growth that fracking has recently brought to North Dakota will be ephemeral if other industries are not able to replace the oil producers when the oil boom ends. By saving money for the future and promoting the health of all sectors of the state economy, North Dakota can use its new wealth responsibly and avoid falling victim to Dutch disease. If this does not happen, the current oil boom, like the state's previous oil booms, will end without creating permanent prosperity. R

References

Brown, Chip. 2013. "North Dakota Went Boom." *New York Times Magazine.* New York Times Co., Jan. 31. Web March 17, 2013.

"Chile." 2013. *World Factbook.* Central Intelligence Agency. Web March 17, 2013.

Davies, Phil. 2012. "Desperately Seeking Workers in the Oil Patch." *fedgazette.* Federal Reserve Bank of Minneapolis, April. Web March 17, 2013.

Ebrahimzadeh, Christine. 2012. "Dutch Disease: Wealth Managed Unwisely." *Finance & Development.* International Monetary Fund, March 28. Web March 17, 2013.

Karl, Terry. 2007. "Oil-Led Development: Social, Political, and Economic Consequences." *CDDRL Working Papers.* Center on Democracy, Development and the Rule of Law, Freeman Spogli Institute for International Studies, Stanford University. Web 17 March 17, 2013.

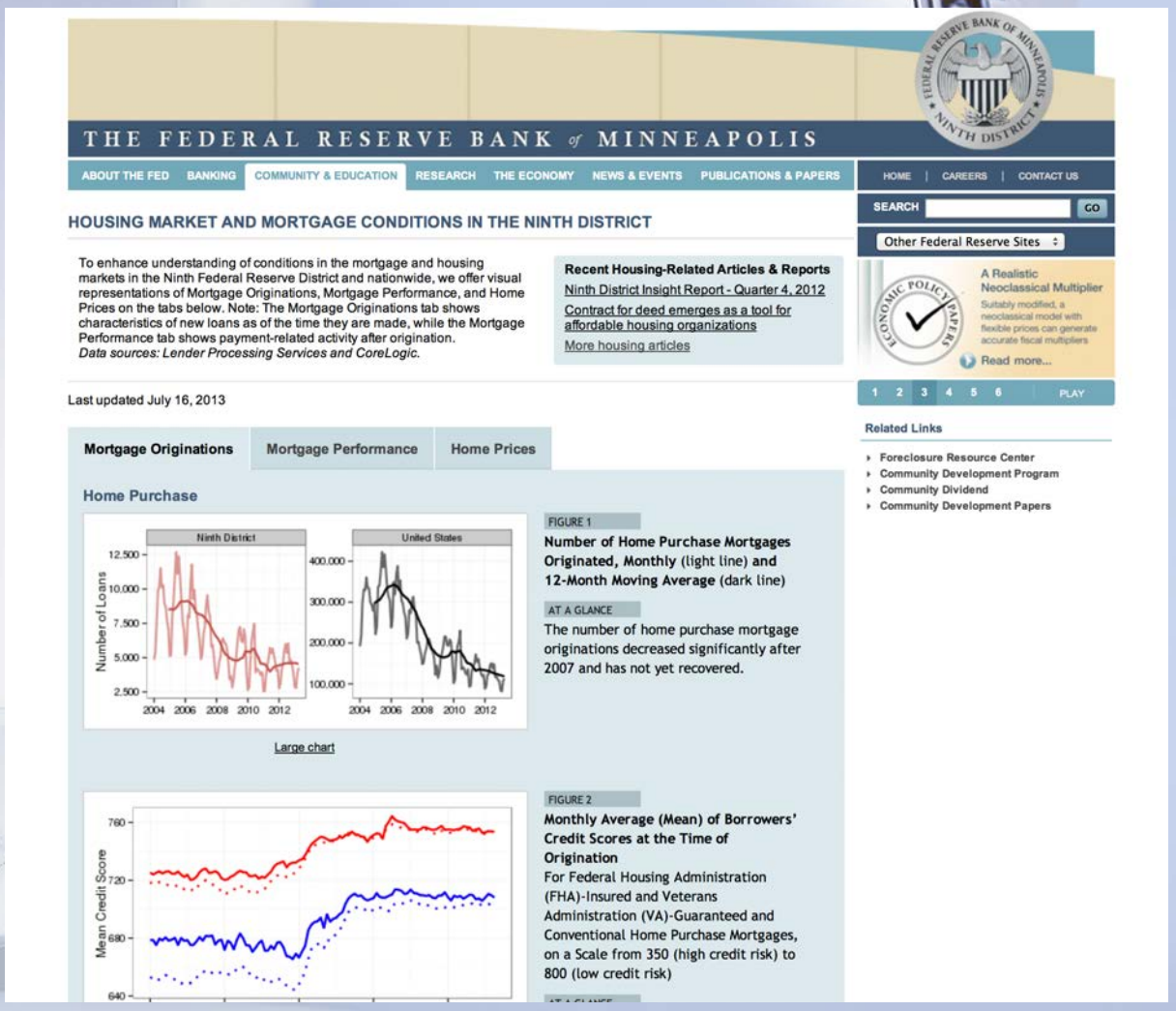
Madrick, Jeff. 2013. "The Anti-Economist: A Bit of Good News." *Harper's Magazine,* April.

Mahon, Joe. 2005. "Black Gold Rush." *fedgazette.* Federal Reserve Bank of Minneapolis, September. Web March 17, 2013.

Manning, Richard. 2013. "Bakken Business: The Price of North Dakota's Fracking Boom." *Harper's Magazine,* March.

"North Dakota Legacy Fund." 2013. *SWF Institute.* Sovereign Wealth Fund Institute. Web March 17, 2013.

Virtual Fed



Wary home companion

The housing market has been one of the great dramas of the past decade; its boom and bust were principal factors behind the financial crisis and Great Recession. Slow home sales and construction have been major drags on recovery. The more recent strength in housing sales and construction has been a significant boon for the national economy. The Minneapolis Fed recently launched a web page to illustrate that drama.

The Housing Market and Mortgage Conditions page shows charts and maps for each state in the Minneapolis Fed's district and for the nation as a whole, marshaling data to track the number of new mortgages (and thereby home sales), the performance of existing mortgages (trends in foreclosure rates, for instance) and the ups and downs of housing prices. By following these indicators before and since the burst of the housing bubble, the Conditions page gives perspective on the strength of the current recovery. It also shows clearly how much further we need to go to get back to normal.

Take in the drama. Tickets are free: http://www.minneapolisfed.org/community_education/housing/

—Joe Mahon

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