Federal Reserve Bank of Philadelphia

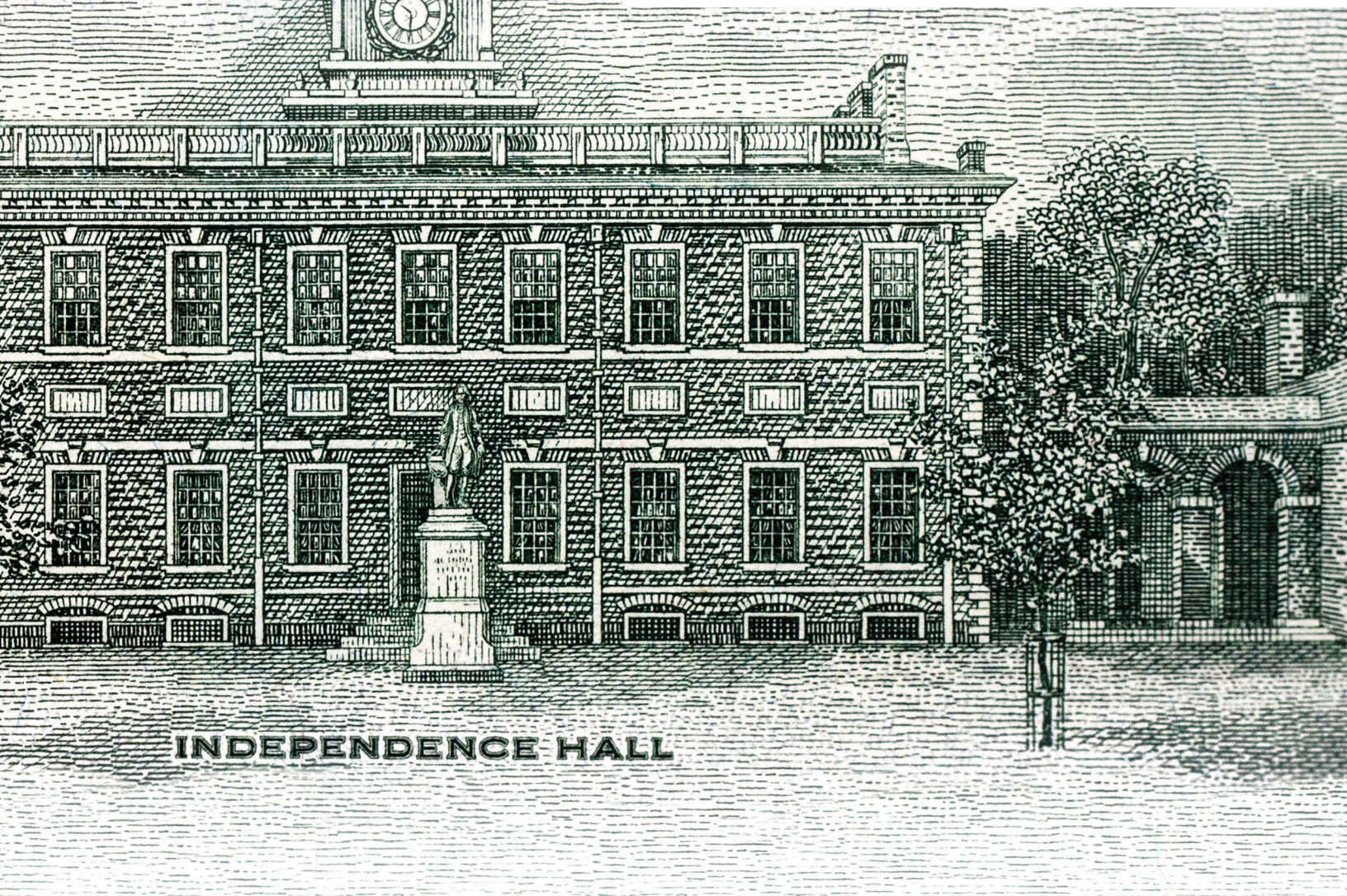
First Quarter 2018
Volume 3, Issue 1

Economic Insights

The Policy Perils of Low Interest Rates

Banking Trends

Nontraditional Insurance and Risks to Financial Stability



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Economic Insights

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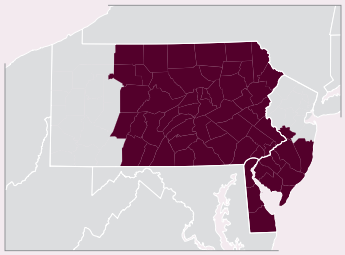

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About the Cover

The $100 bill is all about Philadelphia—and the founding of our nation. On its face is Benjamin Franklin, whose arrival in Philadelphia from Boston at age 17 helped change the course of history. On the reverse is the engraving adapted for our cover image of Independence Hall, where the Declaration of Independence and Constitution were debated and signed. Two blocks north on Sixth Street is the current home of the Federal Reserve Bank of Philadelphia, founded after the Federal Reserve Act of 1913 authorized the issuance of Federal Reserve notes such as the $100 bill. To see how the look of the $100 bill has evolved since 1914, go to: **https://www.uscurrency.gov/denominations/100**.

Photo by Rich Wood.

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The Policy Perils of Low Interest Rates

Well before central banks slashed rates to fight the Great Recession, long-term market rates began slipping. With no reversal in sight, will policymakers lose their main recession-fighting tool?

Lukasz Drozd is a senior economist at the Federal Reserve Bank of Philadelphia. The views expressed in this article are not necessarily those of the Federal Reserve.

BY LUKASZ A. DROZD

The primary tool that central banks have to fight recessions is to cut interest rates so as to encourage enough borrowing and spending to return the economy to full employment. But as we experienced during the Great Recession, there is a natural limit to how low interest rates can go: It is known as the *zero lower bound*—or the *effective* lower bound. When the interest that banks pay on deposits reaches zero, lowering rates further means depositors earn a negative return—in other words, they must actually pay to deposit their money—making it more attractive to stuff cash in a mattress. At that point, monetary policymakers are left without their most tested method of stimulating demand.[1]

The Great Recession marked the first time in the postwar era that the zero lower bound became a relevant constraint for monetary policymaking worldwide.[2] Unable to lower rates any further, the Federal Reserve and central banks in Europe and other developed countries struggled to deliver the additional monetary policy stimulus needed to counteract the deepest economic contraction since the 1930s, finally resorting, as I will discuss, to less proven, unconventional tools such as *forward guidance* and *quantitative easing*. Nine years on, economists are still debating the extent to which the lack of the primary monetary policy instrument contributed to the severity of the recession.

Why Can't Central Banks Simply Set Rates Below Zero?

Contrary to the common perception, central banks do not set interest rates across the economy. Most rates are determined by supply and demand forces in financial markets, and central banks influence these forces to move rates to the desired level.

The Federal Reserve, for example, targets the interest rate at which banks lend to each other overnight, the so-called federal funds rate. This market rate is determined by the supply of and demand for funds in the interbank market, where banks borrow and lend overnight to ensure they are never holding too little or too much in required reserves based on daily fluctuations in their assets and liabilities. The Fed targets this particular market and this particular rate because it can most directly influence it and at the same time tightly control the availability of funds in the banking sector, which is under its supervision. Since the current and future cost of funds is the key determinant of how much banks charge their customers for loans, when the fed funds rate moves or is expected to move, interest rates across the economy move as well, and so does aggregate demand.[3]

When the zero lower bound is not an issue, the Fed can lower the fed funds rate by, in essence, printing money to purchase government bonds from primary broker-dealers, which are bank subsidiaries or deal with banks and carry out the transaction through their accounts with the Fed. The Fed credits the broker-dealer's account with an electronic deposit equal to the payment for the bonds. The recipient banks may ultimately lend these funds to firms and households, but since it takes time to find such long-term customers, banks typically look to earn interest in the meantime by lending the funds in the fed funds market. Because this activity increases the supply of funds in the interbank market, their price—the fed funds rate—declines.

While the Fed can increase the supply of funds at will, it cannot induce the fed funds rate to fall much below zero. In principle, the Fed could "tax" banks' cash, prompting them to lend their excess to other banks, even at negative interest. But banks would ultimately have to pass on the cost of such a tax by charging their customers for making deposits—in other words, imposing a negative rate on deposits. Since depositors can just as well stuff money in their mattresses, there is a limit to how much banks can charge for deposits. Hence, there is a limit to how low rates can go before they hurt bank profits and credit conditions across the economy, which would work against the Fed's goal during a recession of stimulating aggregate demand by driving down rates.

Today, the Great Recession is long over. Economic output and employment have recovered, and the Federal Reserve has hiked its policy target rate several times, causing market rates across the economy to begin rising again, to the relief of savers. Yet, to policymakers, the problem of the zero lower bound remains a major concern. What alarms them is that beyond cyclical, policy-induced fluctuations, market interest rates have been trending downward for years, starting long before the last recession, and bringing the zero lower bound ever closer. If this trend has continued through the crisis and current expansion, and many economists believe it has, then policymakers could face the next major recession without a monetary remedy, as occurred with dire results in the Great Depression. Even a mild recession could compel policymakers to turn to the kind of extraordinary interventions employed during the latest crisis, only this time without the extra margin of first responding by cutting rates.

As I will discuss, the nature of the forces behind the decline in interest rates gives little hope for a reversal in the foreseeable future. As I will also discuss, this outlook is prompting study and debate over whether a low-rate environment calls for a fundamentally different approach to monetary policy and to how central banks will fight recessions in the future.

The Global Decline in Interest Rates

Today's exceptionally low interest rates are often blamed on the Great Recession and the economic malaise that lingered in its aftermath. But the picture that emerges from an analysis of the average interest rate across countries shows that the decline very much predates the Great Recession. Accordingly, the low rates prevailing currently may have less to do with the crisis and more to do with the secular global decline in long-term interest rates.

To pinpoint the beginning of this decline, economists follow the evolution of the average inflation-adjusted yield on long-term bonds issued by governments of major world economies that are fiscally sound and open to international capital flows. Averaging long-term government bonds helps filter out forces that are expected to reverse course such as business cycle fluctuations or monetary policy interventions to fight recessions.[4] Tracking the average world interest rate also helps identify the trend because it focuses on movements driven by forces that are common across countries and hence unlikely to be canceled out by international capital flows, which tend to equalize returns across countries in the long run. In addition, tracking the average world interest rate removes the effect of expected (real) currency exchange rate movements, which can cause interest rates to diverge from the actual return that global investors earn after taking into account differences in the rate of return on currencies implied by exchange rates.[5] The estimated average world interest rate suggests that long-term rates have been declining since at least the 1990s.[6] The real interest rate paid on 30-year U.S. Treasury Inflation Protected Securities has followed a remarkably similar downward path, highlighting the relevance of global trends for the evolution of U.S. interest rates (Figure 1).

The global secular decline in long-term rates—alongside aggressive interest rate cuts during the Great Recession—is a key reason why economists believe that even though central banks have begun raising their policy rate targets, they might still be operating close to the zero lower bound. What reinforces these concerns is the fact that, as the economic recovery has gained momentum around the globe, both inflation and interest rates remain exceptionally low. While central banks can act to move interest rates across the economy to stimulate spending, if they hope to ensure low and stable inflation they must over the long run respect the supply and demand forces generated from within the economy that drive interest rates. Keeping rates below the natural level implied by these forces, known as the *neutral* interest rate—also called the *natural* rate or *r-star*—eventually leads the economy to a state of full employment.[7] But at that point, further stimulation no longer prompts firms to increase employment; rather, it makes them raise prices to meet the excess aggregate demand implied by below-neutral rates, ultimately leading inflation to rise out of control.[8]

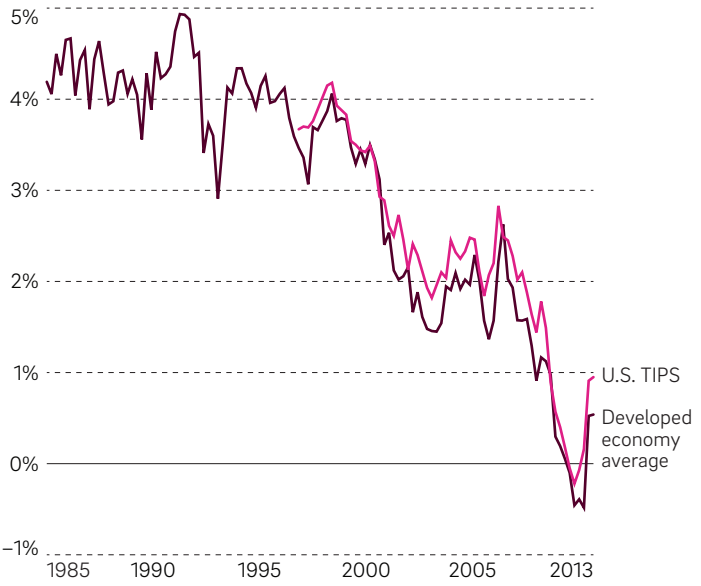
While today's lower rates may reflect the still-accommodative stance of monetary policy, economists attribute much of the secular decline in policy rates since the 1990s to the global decline in the neutral rate (Figure 2). What leads them to this conclusion is the long period in question—a period that includes both economic expansions and recessions—and the remarkably stable rate of inflation during this time.

This assessment is confirmed by econometric studies that aim to estimate the neutral rate using empirical data. The best known among them, by Thomas Laubach and John C. Williams, finds the neutral rate to be below zero.

FIGURE 1

Interest Rates Have Been Falling Since the 1990s

Average inflation-adjusted interest rate in developed economies, 1985–2013, and 30-year U.S. Treasury Inflation Protected Securities yield, 1998–2013.



Sources: King and Low (2013) and Treasury Department.

Note: Inflation-adjusted interest rate as estimated by Mervyn King and David Low using inflation-protected long-term government bonds issued by G-7 countries, minus Italy, 1985–2013. Inflation-adjusted yield earned on 30-year U.S. Treasury Inflation Protected Securities held to maturity.

While finding slightly higher estimates, two other studies confirm these findings using a different methodology.[9] A third, more recent, analysis[10] yields a markedly higher estimate by allowing for investor preferences to shift toward safe U.S. bonds, but it also suggests the neutral rate has fallen to an alarmingly low level, below 100 basis points.[11]

Forces at Play for the Foreseeable Future

Adding to concerns that today's low rates may complicate the conduct of monetary policy in the future are model-based studies that see demographic trends—and to a lesser extent, slower productivity growth—in developed countries as the main culprits. Since these changes are persistent, the models predict that rates will remain depressed for the foreseeable future. How do the forces identified by the models shape interest rates, and how will they evolve in the future?

Three model-based studies that focus solely on demographics forecast that interest rates will continue to decline until at least 2050 given projected global demographic trends, even absent any productivity slowdown.[12] A recent detailed study for the U.S. economy confirms the forecast for demographics, while finding that the productivity slowdown will also play a role in depressing interest rates.[13]

All of these studies seek to understand the principal driving forces behind the demand for and supply of funds in financial markets, where interest rates are determined. The models derive the supply of funds from household net saving for retirement, while the demand comes from firms that seek funds to invest in capital to produce goods and services, with interest rates balancing demand with supply by falling whenever demand rises or supply falls.

Demographics

What makes demographic trends play a crucial role in the models is that saving and working vary predictably over a person's lifetime. The average lifecycle profile of a household exhibits a remarkably similar pattern across countries (Figure 3). That is, minors have little income, as they supply little labor, yet they consume out of the income of their parents, on net subtracting from the savings of the household sector as a whole. Similarly, retirees live off their accumulated savings, supply little labor, and also subtract from the savings of the household sector. The bulk of household savings and labor supply come from working-age individuals, so their share of the population is a crucial determinant of how much households overall save.

Demographic forces matter not only for households' saving behavior but also for firms' demand for funds to invest in capital, because when demographics change, so does the supply of labor. Models assume that labor and capital are complementary inputs in the production of goods and services: As less labor is employed in production, capital inputs become less productive, meaning that the size of the labor force affects the amount of capital investment and hence

FIGURE 2

Estimated Neutral Rate Has Likewise Plummeted

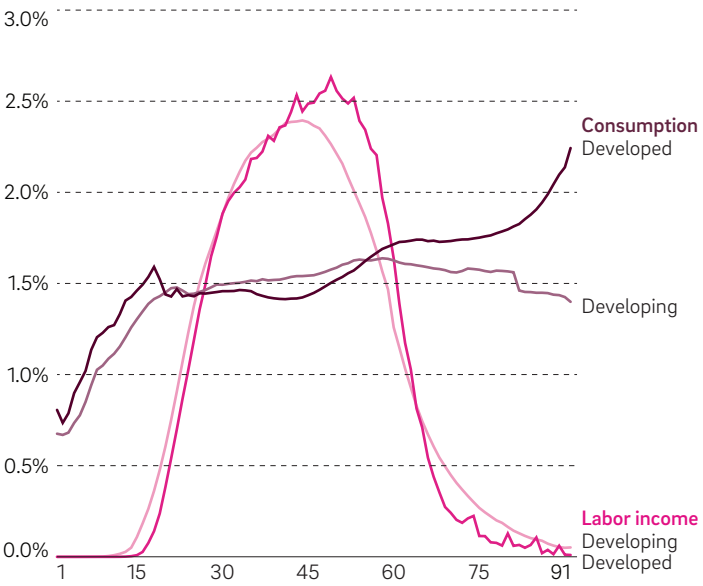
The Laubach and Williams estimate of the neutral U.S. interest rate, 1985–2017.

Source: Laubach and Williams (2003), online data set as of July 28, 2017, www.frbsf.org/economic-research/files/Laubach_Williams_updated_estimates.xlsx.

FIGURE 3

Propensity to Earn and Save Varies Predictably by Age

Average consumption and labor income over the lifecycle in developed and developing economies.



Source: Lee and Mason (2011), selected data from www.ntaccounts.org.

Note: Average earnings and consumption by age. Developed economies: Canada, France, Germany, Italy, Japan, United Kingdom, United States. Developing economies: Brazil, Chile, China, Philippines, Hungary, India, Indonesia, Mexico, Peru, South Africa, South Korea, Thailand, Turkey.

firms' demand for funds. This assumed complementarity between labor and capital is consistent with the remarkable stability across time and countries of the share of an economy's total income that goes to wages and salaries. Although it has declined somewhat globally for about the past 15 years, labor's share of income had remained stable despite a major decline in prices of capital goods and interest rates, which absent the assumed complementarity between labor and capital would not have happened to this extent, according to the models.[14]

Both key demographic trends that according to these models have affected interest rates—slower population growth due to lower fertility and longer life expectancies (Figure 4a), and declining labor supply due to aging and the resulting rise in the share of retirees in the population (Figure 4b)—are projected to continue, and at a faster pace than in the past.

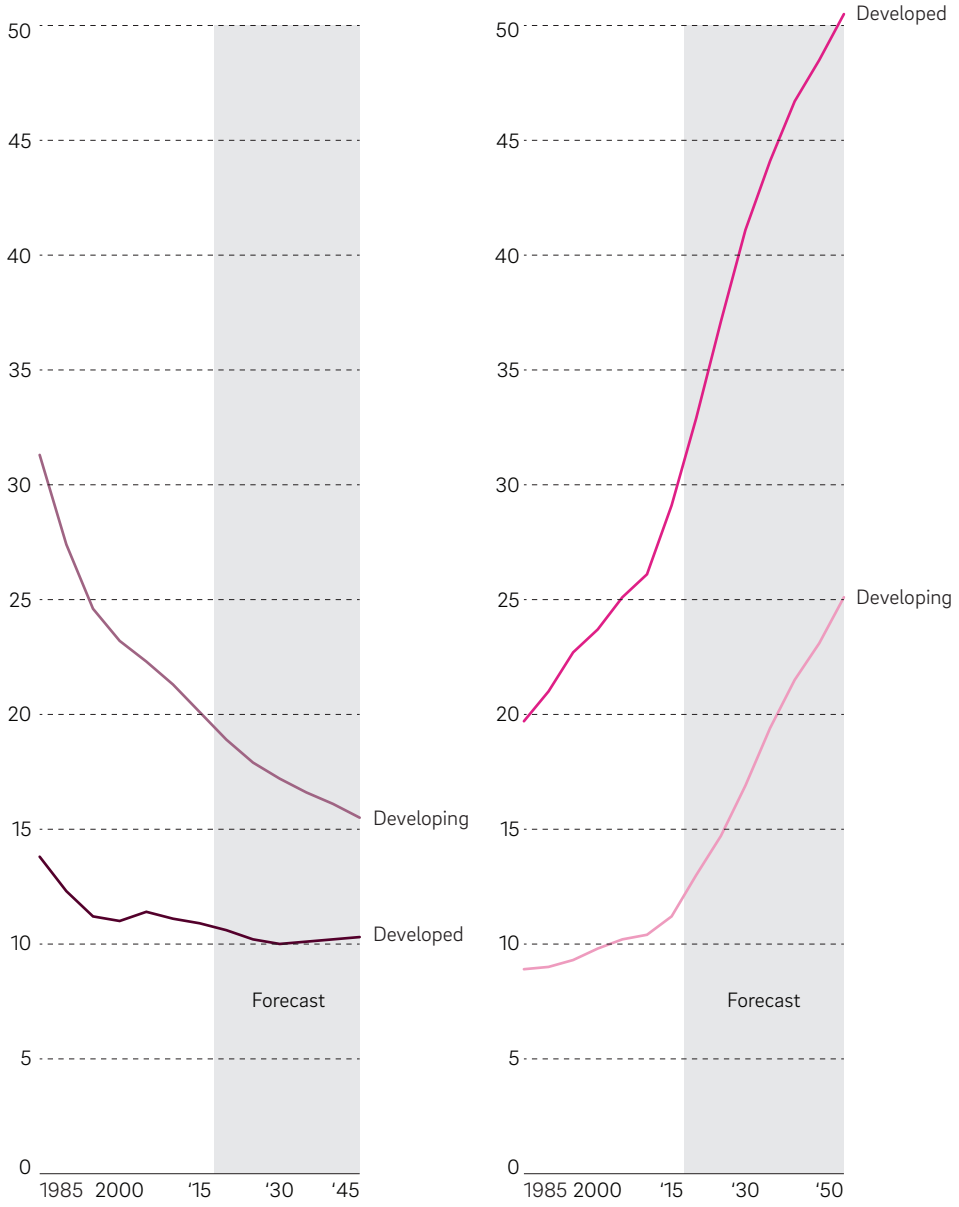
The basic mechanism that makes these trends relevant for the evolution of interest rates around the globe is that lower fertility implies that the working-age population saves more on net, as there are fewer minors. Similarly, longer life expectancy implies that workers in midlife save more to afford longer retirements. Although the growing share of retirees in the population has the opposite effect and tends to reduce the net savings of the household sector, it also reduces labor supply and hence the demand for capital and investment due to the complementarity of capital and labor, for an attenuated or even opposite net effect on interest rates.

FIGURE 4

Global Demographic Trends Likely to Continue

4a: World birth rate per 1,000 population in developed and developing regions.
Percent

4b: Old-age dependency ratio.
Number of people age 65 and older to the number age 20–64, percent



Source: United Nations Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2017 Revision. Custom data from https://www.un.org/development/desa/publications/world-population-prospects-the-2017-revision.html.

Productivity

Productivity in developed countries, and also globally, has been rising more slowly in recent years, leading to projections of slower income growth. [15] What makes the rate of productivity growth important is that future income depends on labor productivity growth; if slower growth is expected, the working-age population may be encouraged to save more of what they earn so they will be able to maintain their targeted level of consumption in the future. Not all studies take the productivity slowdown into account, but those that do conclude that it is a force to be reckoned with.

A comprehensive study of U.S. interest rates that analyzed the effect of not only demographics but also productivity growth, government debt, and capital goods prices found that, had it not been for the offsetting effect of rising U.S. government debt, the productivity slowdown would have depressed interest rates further. Productivity growth is difficult to forecast, and initially reported growth rates are sometimes substantially revised. However, the analysis—by Gauti Eggertsson, Neil Mehrotra, and Jacob Robbins—suggests that productivity would have to grow at trend rates not seen in the postwar period to undo the effect of demographic forces.

Other Forces

Two other factors that model-based studies do not take into account might also have affected the evolution of interest rates around the globe.[17] Commentators have recently emphasized a potential role for rising income inequality within countries and China's unusually high national saving rate.

Income inequality has been rising in most countries, especially in developed ones, raising the question of how this trend might have affected interest rates.[18] Because the rich generally save a larger fraction of their income, inequality within a country tends to raise the net savings of its households overall.

Lukasz Rachel and Thomas D. Smith shed light on this issue by showing that within-country inequality is correlated with cross-country net savings. Based on this fact, they estimate that income inequality accounts for about one-tenth of the decline in interest rates and argue that if inequality rises further, interest rates will fall further. [19]

By focusing on averages, economic models also do not take a full account of idiosyncratic differences among countries. For example, China's high saving rate has been quite an outlier given that nation's level of economic development. China's consumption profile is well below even lower-income countries (Figure 7). Today, China is actively moving toward a more consumer-oriented rather than export-oriented economy, which opens up the possibility that its saving rate may decline in the future, alleviating the downward pressure that its growing economy exerts on world interest rates. However, there are important caveats to this reasoning. One, this

How Do Demographic Forces Affect Interest Rates?

Demographics lower interest rates by affecting both the supply of and demand for funds in financial markets. In Figure 5, the upward sloping blue line represents the supply of funds. It rises as interest rates rise because higher interest rates encourage saving. The downward sloping red line represents the demand for funds. It falls as interest rates rise because higher rates make loans more costly, thereby discouraging borrowing. The equilibrium interest rate balances out the demand for funds with the supply of funds where the two lines intersect. ❶ In recent decades, falling birth rates and rising longevity have increased net household savings, increasing the supply of funds in global financial markets. ❷ But rising life expectancy has also increased the share of retirees in the population, for an attenuated effect on the net supply of savings and interest rates. ❸ Yet, it appears that rates have continued to decline because the rising share of retirees has also reduced the size of the labor force and hence the demand for capital and funds.

A remarkable feature of the dynamic illustrated here is that it is consistent with little change in the global saving rate. This observation is broadly consistent with the evidence.[16] While the saving rate in the U.S. and other advanced economies has been declining, for the world as a whole it has remained remarkably constant as rates have fallen (Figure 6).

FIGURE 5

How Demographics Have Lowered Interest Rates

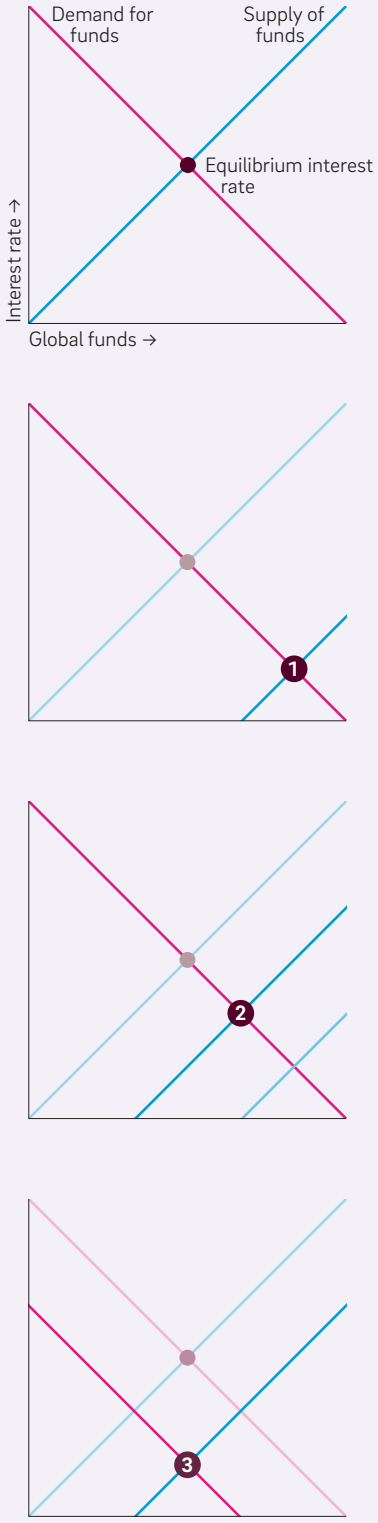
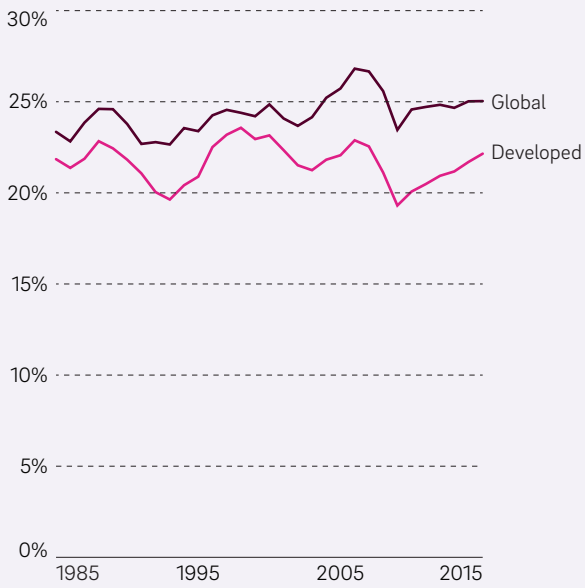


FIGURE 6

Lower Rates Have Not Spurred a Rise in Global Saving

Gross savings (gross national income less total consumption) as a fraction of GDP.



Source: World Bank, World Development Indicators; custom data from https://data.worldbank.org/indicator/NY.GNS.ICTR.ZS

process will take time. Two, as the gap narrows, China's rising share of world income will continue to depress interest rates until its saving rate is no longer above the world average.

An Uncertain Future for Monetary Policymaking

With the normalization of policy rates well under way but market rates persistently low, policymakers may soon face an important question: What is the best way to respond to recessions given the projected low interest rate environment? Two types of options are being debated: Central banks can accept that whenever they need to stimulate the economy, they will have to resort to employing unconventional instruments within the existing monetary policy framework to lower the effective long-term interest rate that households and firms pay. Or they can work around the zero lower bound by creating a new monetary policy framework to restore the effectiveness of their most proven tool, cutting rates.[20]

Unconventional Tools: Balance Sheet Policy and Forward Guidance

The primary unconventional instrument designed to work within the existing framework is *forward guidance*. The basic idea behind forward guidance is that merely by publicly announcing how interest rates will be set in the future, a central bank can alter the public's expectations about future short-term rates. Since long-term rates are tied to expectations about short-term rates, long-term rates will decline after such an announcement.[21]

Unlike traditional U.S. monetary policy, which aims to influence rates throughout the economy by moving overnight interbank rates, forward guidance aims to achieve the same goal by announcing how future rates will be set. Banks and other financial intermediaries price the long-term loans they make today based on their expected cost of funds in the future, as such loans must be financed over an extended period. So, in principle, if a central bank's forward guidance is credible, lenders will raise or lower the interest they charge on long-term loans accordingly. And in fact, the evidence so far is quite compelling that forward guidance was effective in lowering long-term rates during the crisis.[22]

The second type of unconventional instrument is balance sheet policy, in which a central bank purchases riskier assets from banks and other lenders so they will be in a stronger position to bear risk and hence more willing to lend to firms and households, thereby stimulating the economy. To implement this tool, the central bank either changes the composition of its own balance sheet by selling safer assets or buying riskier assets, or both, or it expands its balance sheet by, in essence, printing money to buy more risky assets.

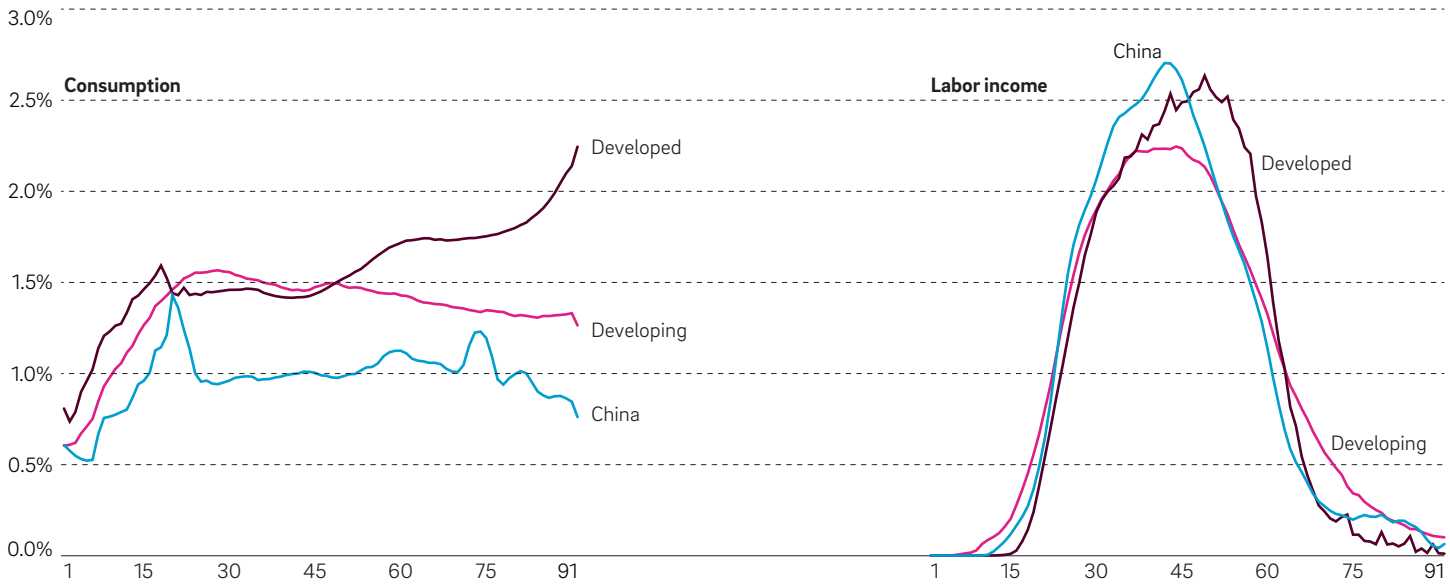
Proponents also argue that purchasing large amounts of long-term assets amplifies the effect of forward guidance. Such large-scale purchases, known as *quantitative easing*, boost the credibility of the forward guidance by signaling the central bank's commitment to making good on its announcements about reducing long-term rates and, in principle, creating room to drive them even lower.[23] Also, by making it easier for financial intermediaries to shed their riskier assets, these purchases lower the *risk premiums* that lenders charge borrowers in the form of higher interest rates as compensation for bearing risk.

Opponents, however, question whether unconventional tools would be effective under any conditions, especially in a deep recession with rates already at or near the zero lower bound. They point out the theoretical limitations of forward guidance

FIGURE 7

China's Saving Rate Likely to Keep Down Interest Rates

Average per capita labor income and consumption rates by age, China vs. developed vs. developing countries.



Source: Lee and Mason (2011), selected data from www.ntaccounts.org.

Note: Developing economies: Cambodia, Ethiopia, Ghana, Indonesia, Jamaica, Kenya, Mozambique, Nigeria, Philippines, Senegal, Vietnam.

and the somewhat mixed evidence regarding the effectiveness of quantitative easing.[24] They also emphasize that the economy's reaction to these less-tested policies is less predictable, requiring them to be deployed more slowly in order to monitor their effectiveness and guard against unintended consequences.

A chief concern regarding forward guidance is that, at the zero lower bound, central banks may not always be able to influence the public's expectations of how future policy rates will be set. At least in theory, neutral rates may fall to zero perpetually, invalidating the effectiveness of any forward guidance that requires the public to believe that rates will eventually lift off the zero lower bound.[25] Also, forward guidance may conflict with central banks' mandate to keep inflation low and stable. That is, central banks may find themselves having to convince the public that they will keep rates low even after the economy is expanding again—letting it "run hot" for a while—possibly undermining their commitment to low inflation. At the very least, policymakers may need to rethink inflation targeting as a means to signal their commitment to price stability and replace it with a more flexible target that better accommodates forward guidance.[26]

As a stark warning of how difficult it may be to escape the zero lower bound once it becomes binding, skeptics of unorthodox tools cite Japan, which has remained at the zero lower bound for decades now, despite repeated unconventional policy interventions by the Bank of Japan.[27] Indeed, while the evidence suggests that unconventional tools can stimulate demand, Japan offers a cautionary tale. In 1999, the Bank of Japan introduced a zero interest rate policy in which the overnight rate was targeted "as low as possible." In 2001, the central bank introduced quantitative easing and an early form of forward guidance. All these efforts largely failed to stimulate the economy and raise inflation. In 2013, the Bank of Japan introduced its most aggressive quantitative easing. Inflation rose briefly above the targeted rate but soon fell back below target, where it remains today, suggesting that Japan has been locked in a holding pattern at the zero lower bound for almost two decades now.

It remains an open question whether the policies Japan deployed were simply too small in scale or duration, or whether its experience highlights the limited effectiveness of unconventional monetary policy under the kind of extreme circumstances afflicting Japan.

A New Monetary Policy Framework

Modifying the standard monetary policy framework might well give policymakers enough effective tools to ensure that they can still precisely tailor policy to the state of the economy in a recession. Among the proposals that have attracted the most attention, increasing the inflation target tops the list. Targeting higher inflation was first proposed soon after the Great Recession,[28] and more recently, former Federal Reserve Chair Janet Yellen deemed the issue "one of the most important questions facing monetary policy around the world in the future," and called for more research.[29]

Inflation can remedy the problem of the zero lower bound because nominal interest rates compensate for the expected rate of inflation. That is, higher inflation raises people's expectations of more inflation, prompting them to borrow and spend more at a given nominal interest rate, causing rates to rise from the zero lower bound.[30]

The main objection to raising the inflation target is that inflation is costly. A 2011 analysis of the costs of inflation using modern economic models suggested that even moderate inflation may result in significant misalignments of prices,[31] although a 2017 study of actual price dispersion during a period of high inflation in the U.S. questions this assessment,[32] suggesting rather low costs. Nonetheless, convincing the public that more inflation is needed may prove too high a hurdle, as inflation remains deeply unpopular. In addition, there is a practical concern that central banks may not yet be capable of raising inflation, which could cost them credibility if they failed to deliver on the new higher target.

A more radical proposal than raising inflation calls for replacing paper currency with digital currency that could be "taxed"—that is, whenever the economy needed a monetary stimulus, the central bank could make the virtual currency more costly to discourage savers from hoarding cash when bank deposit rates turn negative.[33] The main advantage of such a solution is that the inflation target could stay at the current level or even be lowered, since central banks would have no problem driving interest rates below zero in any inflation environment.[34] However, maintaining two parallel currencies or abolishing cash would mean entering uncharted waters for central banks, as such a solution has never been tried, and while appealing in theory, in practice there could be challenges.[35]

As a last resort, policymakers could pursue dismantling the separation between monetary policy and fiscal policy to allow central banks to finance government spending by, in effect, printing money.[36] Although *helicopter drops* of money, as they've been called, could give central banks more power to stimulate the economy, breaking the separation between monetary policy and fiscal policy is a controversial proposal. A central bank that ventured into fiscal policy would likely find itself under pressure from the private sector, financial markets, and the government to use its balance sheet to relax fiscal constraints in the short run at the risk of undermining the stability of the monetary system.[37]

Concluding Remarks

Interest rates have been declining globally for years and may not rise in the foreseeable future, according to current projections. The experience of the Great Depression cautions that a major recession without an adequate monetary or fiscal accommodation can have disastrous consequences for the economy. How central banks will adapt to this "new normal" is still unclear. What is clear, however, is that the zero lower bound will likely remain at the top of central banks' agendas, as sooner or later a major recession will come along to test whatever tools are available to fight it.

Notes

1 Because there are costs to storing large amounts of cash, in practice central banks may be able to drive interest rates below zero. So, for all practical purposes, the effective lower bound occurs at whatever rate results in cash hoarding. Negative interest rates have been implemented in Europe and Japan to extend the scope of conventional monetary policy. See "Why Can't Central Banks Simply Set Rates Below Zero?" on p. 1 for details.

2 The first country after the Great Depression to experience the zero lower bound was Japan, as I discuss later.

3 While the actual operating procedures differ across central banks, the basic principle of the transmission mechanism outlined here remains similar.

4 Governments can borrow for the long term by issuing either long-term bonds or short-term bonds in a staggered fashion so that the proceeds from current short-term issuances can be used to pay investors who purchased prior issuances, thereby effectively borrowing for the long term. Hence, governments will pay significantly higher yields on long-term debt only if they expect borrowing costs for short-term bonds to rise persistently, which is not the case with transient forces.

5 Averaging interest rates across a large number of countries eliminates the effect of expected exchange rate movements because exchange rates are reciprocal: If one currency is expected to strengthen, others are therefore expected to weaken, for an offsetting effect on in interest rates around the globe and an attenuated effect on the average interest rate.

6 As estimated by Mervyn King and David Low, 2013.

7 Full employment does not imply no unemployment—as at any given time a certain number of workers are always between jobs—only that there is no unemployment caused by a cyclical deficiency of aggregate demand, as occurs in a recession. The unemployment rate that occurs at full employment is known as the natural rate of unemployment.

8 Amid rising prices, workers demand higher wages, leading firms to further increase prices to cover their rising labor costs, leading workers to demand still higher wages, and so on.

9 See the work by Jens H.E. Christensen and Glenn D. Rudebusch and by Benjamin Johannsen and Elmar Mertens.

10 See the study by Marco Del Negro, Domenico Giannone, Marc P. Giannoni, and Andrea Tambalotti.

11 James Hamilton, Ethan Harris, Jan Hatzius, and Kenneth West show that from the long-term international perspective, these estimates are more uncertain.

12 See Dirk Krueger and Alexander Ludwig's paper as well as the study by Etienne Gagnon, Benjamin Johannsen, and David Lopez-Salido. The paper by Carlos Carvalho, Andrea Ferrero, and Fernanda Nechio suggests similar findings, although it does not offer a long-term forecast.

13 See the work of Gauti Eggertsson, Neil Mehrotra, and Jacob Robbins, who include the productivity slowdown among other factors.

14 For more details on the labor share, see Roc Armenter's *Business Review* article. The analysis by Eggertsson and his coauthors concludes that although labor's declining share of U.S. income has contributed to interest rate declines, it has been a secondary factor.

15 For an accessible discussion, see Mike Dotsey's *Economic Insights* article. Robert Gordon has been the most prominent advocate of the hypothesis that the productivity slowdown in the U.S. and other developed countries is here to stay. For a contrarian and more optimistic view of what the future may bring, see the book by Erik Brynjolfsson and Andrew McAfee.

16 An alternative hypothesis put forth by Charles Bean, Christian Broda, Takatoshi Ito, and Randall Kroszner to explain the remarkable stability of the world saving rate holds that either demand or supply is insensitive to rates, implying that one of the lines in Figure 5 is vertical. Microeconomic studies suggest that both investment and saving respond to interest rates. See the discussion in the paper by Lukasz Rachel and Thomas Smith.

17 See, for example, the blog post by former Federal Reserve Chairman Ben Bernanke on the global savings glut.

18 The rise in the income distribution in this case is measured by the Gini coefficient, which ranges from 0, in which all households in a country would have the identical income, to 1, in which a single household would earn all the income and the rest earn nothing.

19 Krueger and Ludwig point out that part of the rise in inequality may be explained by aging and show that their model in part captures the increase in inequality measures in the data.

20 See former Federal Reserve Chair Janet Yellen's 2016 speech outlining the future of U.S. monetary policy. See also Bernanke's 2017 discussion paper.

21 See Edison Yu's *Economic Insights* article for an accessible explanation of how short-term rate expectations affect long-term rates.

22 See Michael Woodford's discussion of the effectiveness of unconventional monetary policy instruments deployed during the crisis.

23 See the work by Leonardo Melosi.

24 Yu's *Economic Insights* article also explores the theoretical challenges and evidence regarding quantitative easing.

25 See the work by Eggertsson and his coauthors.

26 In this context, price-level targeting is often considered a better alternative to inflation targeting to signal a central bank's commitment to price stability and to communicate its intentions without compromising the effectiveness of forward guidance. For a recent proposal along these lines, see the discussion paper by Bernanke.

27 An overview of the evidence on the effectiveness of long-term asset purchases and quantitative easing can be found in, for example, Woodford's discussion paper.

28 See the work that Olivier Blanchard did with Giovanni Dell'Ariccia and Paolo Mauro while Blanchard was research chief at the International Monetary Fund. Also see the work by Laurence Ball as well as Stephen Cecchetti and Kermit Schoenholtz.

29 See page 14 of the transcript of former Chair Yellen's press conference of June 14, 2017, at https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20170614.pdf. The open letter that prompted the question can be found at https://populardemocracy.org/news-and-publications/prominent-economists-question-full-inflation-target.

30 Say you want to take out a loan and expect that by the time you need to pay it back both wages and prices will have accelerated. The dollars you will repay your debt with will purchase less than the dollars you borrow, and you will have to work less to repay your debt. So, at any fixed nominal interest rate, the expectation of higher inflation will make the lender want to lend less but will encourage you to borrow more.

31 See the work by Olivier Coibion, Yuriy Gorodnichenko, and Johannes Wieland.

32 See the study by Emi Nakamura, Jon Steinsson, Patrick Sun, and Daniel Villar.

33 See "Why Can't Central Banks Simply Set Rates Below Zero?" on p. 1 for an explanation of how "taxing" cash could help break through the zero lower bound.

34 Ruchir Agarwal and Miles Kimball argue that a partial phase-out of paper currency to roll out a parallel electronic currency would suffice to overcome the zero lower bound. The tax could be imposed only when the zero lower bound became a problem.

35 See the discussion paper and book by Kenneth Rogoff for a detailed discussion of key practical considerations underlying a complete or a partial phaseout of paper currency.

36 For a discussion of a policy proposal along these lines, see the paper by Adair Turner.

37 For a detailed discussion of these risks, see, for example, the essay based on the speech by former Federal Reserve Bank of Philadelphia President Charles Plosser.

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Banking Trends:

Skin in the Game in the CMBS Market

Issuers of commercial mortgage-backed securities must now retain a portion on their own books. What evidence is there that the rule will reduce risky lending?

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BY JAMES DISALVO AND RYAN JOHNSTON

The Dodd-Frank Act imposes reforms that are designed to prevent a repeat of the disastrous performance of residential mortgage-backed securities and–less remarked upon–commercial mortgage-backed securities (CMBS) during the financial crisis. Some of these regulations are designed to force issuers of asset-backed securities to have skin in the game–that is, to keep on their own books a slice of the securities they sell and thus retain some of the credit risk associated with the loans underlying the securities. The idea is that an issuer with its own assets at stake has a greater incentive to do its due diligence, and that this stake signals to would-be investors that the issuer also stands to lose money if its securities fail to pay off as promised.

Most residential mortgage securities are exempt from the new rules because their underlying loans already conform to the standards stipulated by the government-sponsored enterprises that buy them. For commercial mortgage securities, however, the regulations are actually binding. But what is the evidence that skin in the game matters? If skin in the game is so important, why don't the securities markets insist that issuers keep an adequate stake in order to protect investors' own interests? That is, do issuers actually need a government regulation to ensure that their commercial mortgages are safely designed and that they lend only to creditworthy borrowers? And if such a regulation is needed, are Dodd-Frank's mortgage securities reforms well crafted?

Do issuers actually need a government regulation to ensure that their commercial mortgages are safely designed and that they lend only to creditworthy borrowers?

Why Have Skin in the Game?

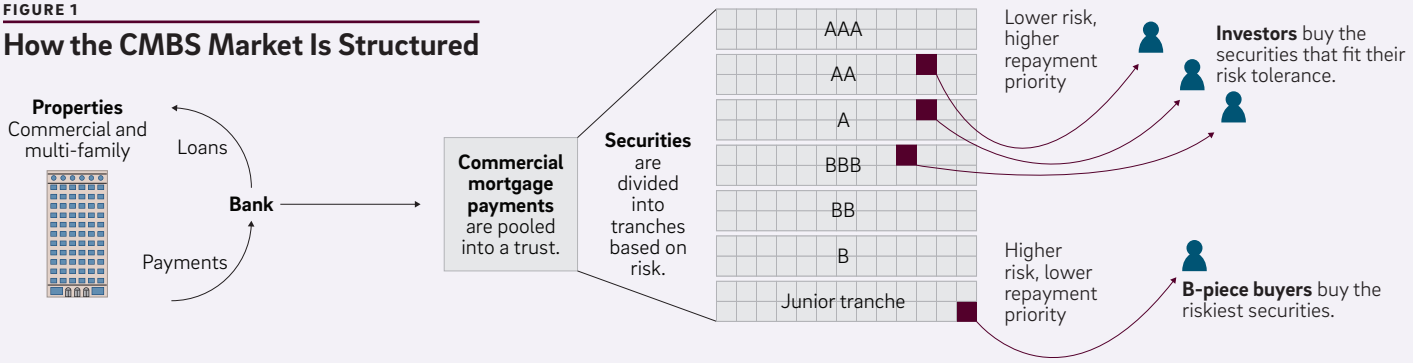
Most models of securitization show that issuers should retain a share of the most junior slice of the securities that they issue, even without a government mandate.[1] Mortgage-backed securities are generally divided into levels of seniority, called *tranches*, and they are then repaid in order of these tranches. The holders of the senior tranches are paid off first, while those holding the junior tranches are last in line and the most likely to suffer losses on the securities if the underlying mortgages perform poorly (Figure 1).

The idea behind the issuer retaining a piece of the most junior tranche, the one that carries the most risk, is that it gives the issuer an incentive to ensure that the security includes high-quality loans. Retaining this risk is thought to send a reassuring signal to investors, who are operating in an environment of asymmetric information–that is, the issuer knows more than they do about the security's underlying loans. It would be prohibitively expensive for the typical securities purchaser to evaluate the characteristics of each and every loan underlying the security, such as the creditworthiness of the borrower and the value of the property.[2] The inability of purchasers to evaluate for themselves the underlying loans can lead to *agency* problems.[3] This means that if an originator makes a loan that it knows is going to be sold and securitized, it may expend too little effort in properly evaluating its risk of default, creating moral hazard–that is, it can reap higher profits without taking on the full risk normally associated with higher potential returns because someone else is bearing part of the cost. Issuers may also pack a security with higher-risk loans, while retaining the higher-quality loans for their own portfolios. Models show that if issuers retain some or all of the junior tranche, purchasers can be assured that the quality of the security is good, which in turn leads them to pay a higher price. As we will show, however, recent theories and empirical evidence address why markets do not necessarily conform to these models.

One might think issuers' desire to maintain a good reputation

FIGURE 1

How the CMBS Market Is Structured



would be a strong enough motivation for them to use high-quality loans in the securities they issue. After all, they don't issue securities just once but many times and would like purchasers to be repeat customers. However, there is evidence that reputational concerns don't necessarily guarantee quality. One study found that commercial mortgage-backed securities issued by institutions that had recently sustained large stock losses performed poorly.[4] The study also found that troubled issuers took poorly performing securities from their own portfolios and packed them into other securitized vehicles. One interpretation of these findings is that a firm that has suffered losses is more likely to fail. Since a good reputation is valuable only if the firm remains a going concern, the value of a good reputation falls for firms experiencing losses and facing a higher likelihood of failure.

Leading up to the financial crisis, issuers often created securities with the intention of selling off the entire issue, sometimes without the knowledge of investors, as we discuss below. A substantial share of these issues proved to be of poor quality, and many observers have argued that the lack of skin in the game was an important reason that the underwriting was so poor. As former Securities and Exchange Commissioner Luis A. Aguilar pointed out, "...since lenders were not going to suffer if the loans were not repaid, they no longer had the incentive of ensuring that the loans would be of appropriate quality."[5] The authors of Dodd-Frank adopted the view that regulations mandating skin in the game are necessary to prevent securitization markets from repeating the lax underwriting that preceded the crisis.

An Overview of the Risk Retention Rule

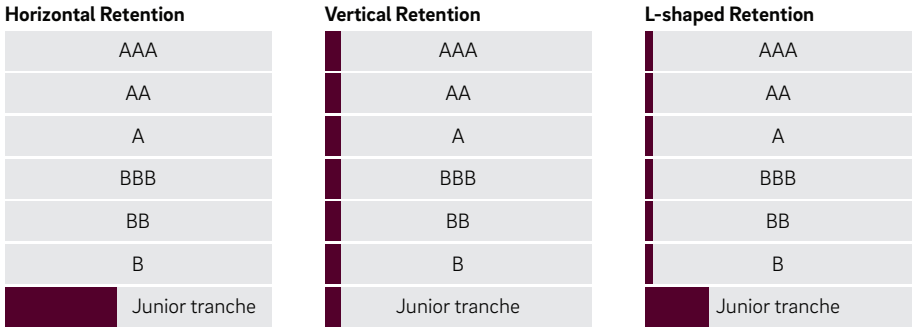
The new risk retention rule—known as Regulation RR—requires issuers of all types of asset-backed securities to retain at least a 5 percent share of any security they issue, as determined by its fair value at the time of issuance.[6] The requirement can be met by holding a share of the junior tranche, which is called horizontal retention, a portion of each tranche, known as vertical retention, or a mixture of the two, known as L-shaped retention (Figure 2). Issuers may not directly or indirectly hedge or transfer the risk of the retained share.[7] However, they may sell off all or part of the junior tranche of their requirement to investors who are experts at evaluating commercial real estate, known as B-piece buyers. In the final analysis, issuers remain responsible for compliance with the risk retention rule as well as monitoring the B-piece buyers' compliance with the rule.

The rule contains several exceptions for issuers of commercial mortgage-backed securities.[8] An issuer is not required to retain any portion of a loan that meets the definition of a qualified commercial real estate loan.[9] The presumption here is that a qualified loan is well documented and has prudent terms, and that the borrower is creditworthy, so the loan is less likely to default. Under the allocation-to-originator option, an issuer may allocate a portion of its required retention to any lender that had originated at least 20 percent of the underlying loans in the pool. The originator must hold at least 20 percent of the required retention but can't hold a larger percentage than the percentage of loans it originated. The rationale for this option is that providing incentives for the originator has essentially the same effect as providing incentives to the issuer.[10]

Note that of the three options for retention, only horizontal retention fits the prescription from economic models that an issuer should retain a share of the riskiest tranche. Regulators say that having three retention options provides issuers with the flexibility to choose

FIGURE 2

Only Horizontal Retention Fits the Risk Prescription



Retention of the first loss tranche in an amount equal to no less than 5 percent of all ABS in the securitization transaction.

Retention equal to no less than 5 percent of each class of ABS issued or a single vertical security which represents an interest in each class of ABS issued.

Retention equal to no less than 5 percent of a combination of both horizontal and vertical retentions.

a structure that is compatible with the practices in a particular securitization market. For example, if an issuer usually retains less than 5 percent of a junior tranche in a commercial mortgage-backed security transaction in a particular segment of that market, the rule allows the issuer to hold the rest of its requirement through a vertical slice. This flexibility permits some variation across asset-backed securities markets, but there is some danger that it simply ratifies inefficient market practices by some participants.

Theory Says Unregulated Markets May Be Inefficient

In a recent theoretical model, Gilles Chemla and Christopher Hennessy demonstrate that unregulated markets do not necessarily provide appropriate incentives for originators to do their due diligence, even when investors are sophisticated, by which we mean they understand the incentives of originators and issuers.[11] Note, Chemla and Hennessy do not argue that investors in CMBS were necessarily sophisticated during recent crisis, only that bad market outcomes can occur even when investors are sophisticated.

In the model, originators of loans must make some costly effort if they want to increase the likelihood that a loan will be repaid in full and on time.[12] This effort might involve carefully examining a builder's books and credit history and analyzing local real estate conditions. When the originator makes such an effort, there is a greater likelihood that the result will be a high-quality loan. But even if originators make this effort, default can still occur; for example, local real estate conditions could deteriorate unpredictably. So, whether or not the originator makes the effort, the loan will have either a low risk of default (high quality) or a high risk of default (low quality). Because there is always some risk of default, investors can't automatically infer that an originator had made too little effort if a loan defaults.

Originators in the model may sell a security based on the expected cash flow from the loan. And they will retain a junior share of the security if they expect to make a positive return from doing so.[13] Otherwise, they will sell off the junior tranche to willing investors. It is costly for originators to keep any portion of the loan on their books; for example, real-world originators use the proceeds from securitizing loans they made previously to fund new loans. In the model, originators determine how much underwriting effort to make by estimating both how much they expect to receive from selling the security to reinvest in new loans and their return on their retained portion.

The model includes two types of investors. Most understand originators' incentives but are not sufficiently informed to fully evaluate the riskiness of a loan. The rest, speculators, are capable of evaluating the riskiness of a loan, but at a cost. Speculators will bear this cost only if they expect to profit from identifying and buying underpriced securities backed by low-risk loans.[14] If speculators are active in the market—later we discuss when they will be active—their buying and selling raises the price of securities backed by low-risk loans and lowers the price of securities composed of high-risk loans. However, while speculators are more informed than most investors, they are less well informed about the quality of the loans than the originators are. So, even with the benefit of superior pricing information from speculators, the prices of the securities are noisy; that is, they don't perfectly reflect differences in loan quality.

How accurately prices reflect the underlying risk of default is important to investors, who typically try to align their portfolios according to their risk preferences. In the model world, some investors may suffer a negative shock to their income, so they would like to purchase insurance from other investors. The more accurately the prices of securities reflect actual default risk, the closer investors can come to fully insuring their income. Importantly, even though managing these risks is important to investors, originators are not compensated for setting prices that convey the true risk; that is, from the originators' standpoint, investors' desire for insurance is an externality.[15]

How accurately prices reflect the underlying risk of default is important to investors, who typically try to align their portfolios according to their risk preferences.

In the simplified world of the model, two main types of market outcomes can arise. One is that originators of low-risk loans retain a junior tranche while originators of high-risk loans retain nothing and fully securitize their loans. This outcome is called a separating equilibrium because originators of loans with different likelihoods of default—low-risk or-high risk—retain different size claims. The idea is that originators of low-risk loans want to signal to investors, via retention, that the loans are indeed of high quality in order to get a higher price in return. In this outcome, the prices of the securities accurately reflect the quality of the underlying loans, so originators have a strong incentive to make more effort to reduce risk. Fully informative prices also help investors better align their portfolios with their risk preferences. In a separating equilibrium, speculators have no role to play because prices are already fully informative and nobody can make a profit by examining securitized loans to buy cheap and sell dear.

The other type of outcome is that all originators hold an identical claim—a pooling equilibrium. Notably, all originators can simply sell off their entire claim to willing investors, in which case the pooling equilibrium could involve no skin in the game.[16] Why might such a situation arise? Remember, an originator of a low-risk loan is motivated to retain a larger share of a junior tranche only by the prospect of fetching a sufficiently higher price. That is, the originator of a low-risk loan wants only to know: Will retaining a big enough share of the loan to convince investors that the risk of default is small produce a higher total return than selling the full share? In a pooling equilibrium, speculators have an incentive to expend the time and effort to examine the loan and profit from trading on their superior information. So, in equilibrium, the price of a low-risk loan will be

higher than the price of a high-risk loan, even if the originator retains no exposure. Indeed, if the price of the high-risk loan is high enough, the originator of a low-risk loan will prefer to have no skin in the game, just like all other originators.

This pooling equilibrium outcome has some undesirable features. Although speculators increase the price of low-risk loans compared with high-risk loans, the prices are noisy because speculators are not fully informed about loan quality. So, investors are still unable to make informed portfolio decisions to achieve their desired level of insurance.[17] Also, there is too much default because originators typically exert too little effort to lower risk.

In this theory, the government can actually do a better job of reducing losses and improving investors' ability to choose investments that reflect their risk tolerance than unregulated markets can. One way it could do so, the authors suggest, would be to require originators to structure their claims in a way that would ensure a separating equilibrium. Specifically, the regulator could allow originators to choose between two set percentages of the security, a larger junior share and a smaller junior share, but they would have to retain one or the other. The regulator would size the required shares in such a way that the low-risk originator will prefer to retain the larger share and the high-risk originator will prefer to retain the smaller share. Because originators of low-risk loans know that default is less likely, they are willing to accept the larger junior share's higher exposure to loss in exchange for a higher price, and vice versa. In effect, by restricting the set of choices available to issuers, the regulator would lead market participants to coordinate on a separating equilibrium.[18] Furthermore, unlike in the separating equilibrium in an unregulated market, even the originator of a high-risk loan would retain at least a small share, thus increasing the high-risk originator's amount of effort.

Alternatively—and perhaps more realistically—regulators could require that all originators hold a share of the junior tranche above some minimum level. That is, regulators could feasibly enforce a pooling equilibrium in which all originators would have skin in the game—as now required under Dodd-Frank. Theoretically, requiring originators to retain a share of the junior tranche would motivate originators to tighten their lending criteria, leading to fewer losses than in an unregulated market.

Another theoretical study emphasizes an additional factor—the importance of investors' ability to observe originators' actual exposure. As we will see in the next section, even if they initially retain some risk, originators are disposed to find ways to minimize their exposure, for example, secretly hedging against the risk of loss. This ability to subsequently shed their exposure without investors knowing it could reduce originators' incentive to do their due diligence. In a model developed by Victoria Vanasco, even when originators can't secretly reduce their initial exposure, outcomes similar to those identified by Chemla and Hennessey arise.[19] But if investors are unable to monitor whether an originator has retained its exposure, particularly bad outcomes arise because originators can no longer use their retained share to convey information to investors. Vanasco's model suggests that preventing such hedging also requires regulation.

Evidence Shows Skin in the Game Improves Quality

There is empirical evidence that skin in the game mattered in the commercial mortgage-backed securities market leading up to the financial crisis. Furthermore, evidence from the CMBS market is consistent with theoretical models such as we described above that indicate that issuers may hold too little skin in the game when markets are unregulated.

Evidence from the CMBS Market

In a segment of the CMBS market known as the conduit market, before a deal is completed, the junior claim, known as the B-piece, is typically sold to sophisticated investors who specialize in evaluating the quality of the underlying collateral. B-piece investors are seen as the last underwriters of a deal before it is issued and generally gather as much information about the quality of the underlying loans as the originators do. They also control which loans go into the pool underlying the deal. During negotiations with issuers, B-piece investors may insist on restructuring the securitization by, for example, throwing out loans that they find are priced incorrectly. So, in principle, the willingness of such well-informed investors to hold a share of the junior claim should play a key role in ensuring the quality of the issuance.

To find out if that is so, Adam Ashcraft, Kunal Gooriah, and Amir Kermani examined this B-piece market in the years before the crisis. They measured the performance during the crisis of deals originated from 2000 to 2007 in which B-piece buyers in turn sold off their share of the most junior, lower-rated (BBB) tranche versus deals in which they retained their share. The rise of collateralized debt obligations (CDOs) and other new financial instruments in the early 2000s enabled B-piece buyers to sell off their shares of the junior tranche and rid themselves of the risk in the underlying loans.[20] The authors argue that investors in the BBB tranche had no way of knowing whether a B-piece buyer had sold off its exposure. Issues in which B-piece investors had sold off their claims performed poorly compared with issues

The Conduit Market
The conduit market is a part of the commercial mortgage-backed securities market that includes only those commercial mortgages that are originated purely to be securitized (Figure 1). Conduit commercial mortgage-backed securities typically consist of a diverse pool of 25 to 100 commercial mortgages that have higher leverage and lower quality than investment-grade loans. Most conduit transactions include a B-piece buyer, although this is not a universal requirement. Lenders in the conduit market include life insurance companies, pension companies, investment banks, and large commercial banks.

in which they retained their exposure, a finding that supports the argument that skin in the game helps reduce agency problems.

Also, the prices that general investors paid for the securities were not sensitive to how much of the junior tranche the B-piece investors had retained, which supports the authors' claim that investors were unaware of the B-piece buyers' true exposure.[21] This result also supports Vanasco's emphasis on the benefits of regulations requiring issuers to maintain their exposure.

Evidence from the RMBS Market

Two studies of another segment of the mortgage-backed securities market, residential mortgage-backed securities, further support the importance of skin in the game in securitization markets. Taylor Begley and Amiyatosh Purnanandam show that private-label residential mortgage-backed securities deals performed better when the issuers held a larger share of the junior claim.[22] The more opaque the security, the stronger this positive effect. That is, if a security was backed by home loans that only the issuer could have useful information about—such as in so-called no-doc mortgages that became popular leading up to the housing crash in which there is no documentation of borrowers' creditworthiness—the bigger the issuer's retained share, the better the issue performed.

Another study also suggests that originators of residential mortgage-backed securities will make a stronger effort to ensure that loan quality is high if their exposure to losses on the loans is greater. Cem Demiroglu and Christopher James found that deals in which the originators of the underlying loans were affiliated with the issuers of the securities experienced fewer losses compared with deals in which the originators and issuers were not affiliated.[23] Similar to the previous study, affiliation was more important to the performance of securitizations with a large fraction of low-doc loans, ones for which documentation was limited. Interestingly, the study also found that for deals in which originators did not retain a portion of the junior claim, yields were significantly higher compared with those in which originators kept a portion. In other words, since investors knew that originators had no skin in the game, they expected the loans to be riskier and demanded higher rates of return for taking on that risk.

Unlike the study of the CMBS market by Ashcraft and his coauthors, both of these studies of the RMBS market find that securities prices are sensitive to issuers' exposure to risk. This finding suggests that investors were aware of RMBS issuers' incentives and knew how exposed to loss issuers were. Thus, investors in the RMBS market were sophisticated, as in Chemla and Hennessy's model.

In contrast, investors in CMBS may have been unaware that B-piece buyers now had wider opportunities to off-load their exposure, because the instruments such as CDOs that afforded those opportunities were still a novelty. Armed with the knowledge of what occurred during the crisis, CMBS investors now may naturally be inclined to monitor for themselves how much exposure B-piece buyers' are retaining without the need for an explicit regulation limiting B-piece buyers' ability to hedge their risk.

Effects of the Regulation

It is too soon to determine whether the risk retention rule has improved the performance of the underlying loans in the CMBS market or whether the restrictions will hamper CMBS issuance in the long run. So far, contrary to fears expressed by some market observers, issuances are up and deals have been priced favorably. According to market data provider Trepp, CMBS issues totaled $70.65 billion in 2016. Between January and August 2017, they had reached almost $64 billion and were on pace to surpass their 2016 volume.

The risk retention rule appears to have changed issuers' behavior, perhaps in unintended ways. The mixture of funding structures used for CMBS issues in the first half of 2017—38.2 percent horizontal retention, 37.5 percent vertical, and 24.3 percent L-shaped[24]—shows that given the choice, issuers will not always choose horizontal, which, according to Chemla and Hennessy and other models, is the optimal structure.

Furthermore, market participants have argued that the new regulation has led to other changes in the CMBS market. In some cases, issuances that previously would have contained an entire large loan are being replaced by multiple, smaller issuances that each contain only a portion of a larger loan, with each small deal having a different issuer. This allows issuers to limit their potential losses, since the amount an issuer is required to retain for a small security is less than it would be on a large security.[25] Note that spreading a loan across multiple CMBS deals in this way means more claimants if the loan defaults, which could complicate the resolution effort. Only in the next downturn in commercial real estate will it become clear whether this will be a significant problem.

In 2017, Treasury Secretary Steven Mnuchin recommended expanding the definition of qualifying exemptions based on the characteristics of the securitized asset class and relaxing restrictions on third-party purchasers of the junior claim.[26] The future of Regulation RR may ultimately depend on not just loan performance in the CMBS market but on whether that provision in Dodd-Frank is rolled back.

Notes

1 See Ronel Elul's 2012 article for a discussion of these models.

2 Unlike a residential mortgage-backed security, which is backed by hundreds of individual home mortgages that are evaluated using a common model, a commercial mortgage-backed security is backed by far fewer loans that are evaluated on a case-by-case basis based on characteristics such as location and property type.

3 Most would-be purchasers tend to rely on evaluations such as risk ratings from a major credit ratings agency. As became clear during the crisis, when even securities with top ratings went bad, the use of ratings agencies does not fully overcome these agency problems.

4 See Sheridan Titman and Sergey Tsyplakov's article.

5 From "Skin in the Game: Aligning the Interests of Sponsors and Investors."

6 Although the regulation governs all asset-backed securities, we focus on those portions that affect CMBS. The regulation defines an issuer—otherwise known as a sponsor—as "a person who organizes and initiates an asset-backed securities transaction by selling or transferring assets, either directly or indirectly, including through an affiliate, to the issuing entity."

7 The intention of this restriction is to make sure that issuers do not undermine the incentive effect of skin in the game by selling off the risk without actually selling the junior security. For example, an issuer of CMBS might hedge the risk that real estate prices will drop by buying a credit default swap, in which the seller compensates the issuer when real estate prices fall. The regulation does not specifically define hedging. Whether a particular hedge is permissible will be determined in practice over time on a case-by-case basis.

8 There are also exceptions for issuers of residential mortgage-backed securities that are composed of conforming loans—loans that meet the underwriting standards of the government-sponsored enterprises (GSEs)—are exempt. In practice, this means that most of the residential mortgage-backed securities market is exempt. The regulation may become binding for a larger share of the RMBS market if and when the private-label mortgage-backed securities market regains strength.

9 The regulation defines a qualifying commercial real estate loan as a fixed-rate loan with a minimum maturity of 10 years and a maximum amortization of 25 years (30 for loans secured by multifamily properties). Lenders must document the income from the property for at least the previous two years. The borrower's debt service ratio must not exceed 1.25 percent for multifamily properties, 1.5 percent for leased properties, and 1.7 percent for all other loans. Also, the combined loan-to-value ratio of all loans on the property cannot exceed 70 percent, and the loan-to-value ratio of the first lien loan cannot exceed 65 percent.

10 Furthermore, allowing the issuer to share risks with the originator might reduce the cost of issuance.

11 Chemla and Hennessy simplify and treat the originator of the loan and the issuer of the securities as a single agent. Throughout this section we use only originators to avoid confusion.

12 In the simplified world of the model, each originator screens a single loan.

13 We focus on the cases in which originators retain a junior tranche if they retain any share at all. In Chemla and Hennessy's model, cases can arise in which originators retain a senior tranche, a particularly bad outcome.

14 In their model, only low-risk loans are profitable to buy. However, speculators can also profit from taking short positions in securities backed by high-risk loans.

15 According to Chemla and Hennessy, another externality, or failure to price in the true cost, is the neighborhood effect of loan defaults. For example, when the failure to screen a borrower's creditworthiness results in a boarded-up foreclosed property, neighboring home values may also drop.

16 To be precise, the authors demonstrate that whenever a pooling equilibrium is possible, a pooling equilibrium in which originators hold no skin in the game is also possible.

17 We are simplifying Chemla and Hennessy's analysis of the relative efficiency of the different equilibrium outcomes. For example, in their model, we can't automatically conclude that a separating equilibrium is better than a pooling equilibrium, although this is one possibility. While the incentives are typically smaller in a pooling equilibrium for an originator to make an effort, speculative buying and selling may lead to a price difference large enough to prompt them to make the effort.

18 In the separating equilibrium designed by the regulator, both types of originators hold skin in the game.

19 Note, in Chemla and Hennessey's model, there is no issue of originators choosing some level of retention initially and subsequently selling off the exposure without investors' knowledge.

20 Banks may repackage certain loans in a security into CDOs, which are then sold to investors on the secondary market. CDOs usually consist of a pool of loans from the lowest tranches in a securitization.

21 The insensitivity might also be consistent with investors' not understanding the importance of skin in the game. However, the empirical studies we discuss below cast some doubt on this explanation.

22 Private-label securitizations are those set up by firms other than government-sponsored enterprises, such as Fannie Mae or Freddie Mac. Begley and Purnanandam study a sample of private-label securitization contracts in 2002 and 2004–2005.

23 Originators can also be the issuers in a securitization transaction. In this study, originators were considered affiliated with the deal if they were also the issuer or if they retained the servicing rights to the transaction. An example of an unaffiliated originator is a loan broker. The broker

underwrites the loan and typically sells it to a bank that will assemble it with other loans into a security.

24 From Trepp's Q1 and Q2 2017 CMBS Issuance Recaps.

25 See the *American Banker* article. The extent to which this development is actually due to regulatory changes is uncertain. While the number of securitizations broken up in this way increased substantially in 2017, this was an acceleration of a trend that began in 2011.

26 See the Treasury Department report.

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Nontraditional Insurance and Risks to Financial Stability

Do insurance companies pose a threat to financial stability? Historically, the answer has been no. But the insurance industry's expansion into nontraditional activities has prompted reconsideration.

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BY YARON LEITNER

When we think of the U.S. insurance business, we usually think of companies that sell life, auto, or homeowner policies. The conventional wisdom is that these traditional insurance activities are regulated by the states largely to protect individual policyholders and should not be a concern to the Federal Reserve, whose regulation of banks is intended to protect the nation's overall financial stability.

However, as became clear during the emergency bailout of the insurer American International Group (AIG) during the financial crisis in 2008, some insurance companies also engage in nontraditional activities, such as selling credit default swaps or lending securities, that could pose a threat to financial stability. The AIG episode has led some to suggest that the Fed should become involved in the regulation of large insurance companies.

How could an insurer pose a threat to financial stability? While there are many reasons that an institution could pose a threat to financial stability, two factors seem key. First, the institution's activities leave it vulnerable to large losses that it cannot handle. Second, those losses are capable of spreading to the rest of the financial system via a domino effect, or contagion.[1] As we will see, traditional insurance activities do not satisfy these criteria, but nontraditional activities do.

To examine more closely why they could pose a threat to the nation's financial system, we will explore some of the nontraditional activities that insurance companies currently engage in and discuss what role, if any, the Fed should play in regulating these companies. But before we do that, it will help to understand why insurers' traditional activities do not pose such a threat.

Traditional Insurance Risk

A traditional insurance company providing, say, auto insurance, collects premiums from policyholders and in return promises to pay for part or all of their loss when an accident occurs. So the insurance company incurs the risk that accidents will occur. With another traditional insurance product, a life annuity, the policyholder pays a premium in return for periodic payments later—usually beginning in retirement and lasting until the policyholder dies. Here, the insurance company incurs the risk that the policyholder will live long enough to more than break even on what he or she paid in premiums.

However, these traditional activities do not expose the insurance company to large losses that it cannot handle. From the insurance company's perspective, these risks are pretty much diversifiable. When an insurance company sells many insurance policies, losses are more predictable and are unlikely to depend on overall economic conditions. The insurance company can then use the premiums it collects from policyholders to make investments that mature when it expects to need to pay claims. To the extent that losses are not completely predictable, insurance companies also set aside money to cover unexpected losses. So unless insurance companies deliberately leave themselves underprepared, they are not expected to experience losses that they cannot handle.[2]

Moreover, in the traditional model, insurance companies do not offer deposit contracts and so are not as subject as banks are to *runs*, in which an unusually large number of depositors try to withdraw their money simultaneously. Bank runs can be triggered if depositors learn about some negative shock—say, a news report that the dominant local industry is shuttering its plants, which could mean deep losses for a bank heavily exposed to commercial real estate. If the shock casts doubt on the soundness of the bank's portfolio and undermines public confidence in its ability to meet its obligations, a run may ensue.

While withdrawals are a normal part of the business of banking, in the case of a run the bank's cash reserves may be insufficient to meet the sudden demand. The fundamental reason that nations regulate their banks is that banks' unique mixture of assets and liabilities is inherently unstable. Banks are in the business of holding illiquid and long-term assets that they fund largely with deposits and other short-term liabilities. Banks

typically keep only a small percentage of their deposits on hand as cash and use most of the money they take in to make loans and invest in financial assets. And many of their assets—such as commercial and industrial loans or commercial real estate loans—can't be easily sold on short notice. A surge in simultaneous withdrawals could force the bank to sell off those assets quickly at prices that are significantly below normal, lowering their value to the point that they are insufficient to pay off the bank's liabilities, causing it to go bankrupt.

For a traditional insurance company, by contrast, even if it does suffer losses that it cannot handle, they are unlikely to spill over to the rest of the economy, for two reasons. First, traditional insurance activities do not significantly expose the rest of the financial system to insurers.[3] Second, the unpredictable losses the insurance industry might face from traditional activities (after, say, a hurricane) are typically uncorrelated with overall economic conditions, and so the financial system is likely to be stable enough to absorb them. In contrast, large losses that occur when overall economic conditions are bad and many other financial institutions are experiencing losses at the same time are a concern to financial stability because the financial system might not be able to absorb them. As we will explore next, some of insurers' nontraditional activities expose them to such losses.

Risks from Insurers' Nontraditional Activities

Credit Default Swaps

A prominent example is AIG's credit default swaps (CDS) operations before it failed in 2008. AIG sold these financial instruments to other financial institutions as protection against losses resulting from mortgage defaults. So AIG was essentially betting against a decline in real estate prices, offering protection against risks that it could not diversify and exposing it to potentially large losses. Indeed, as home prices started to decline, AIG was required to post cash collateral with its CDS counterparties to guarantee that it could fulfill its contractual obligations.[4] Since AIG was unable to come up with all the money, its credit rating was downgraded, which required it to post even more collateral, making its situation even more precarious.[5]

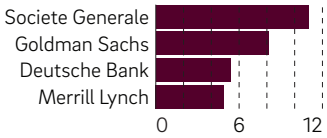
AIG's losses could have spread to the rest of the financial system. One channel through which they could have spread was that a number of money market mutual funds had invested in AIG's commercial paper—short-term loans used to raise immediate cash—exposing them to AIG.[6] Money market mutual funds are considered a safe and liquid investment, and until regulatory changes were implemented after the crisis, the share price of a dollar invested in the funds remained constant at $1.[7] However, as AIG's need for cash grew, its connection with money market investors raised concerns that if it declared bankruptcy and defaulted on its commercial paper, the money market funds could "break the buck," potentially triggering runs on them and other money funds. Indeed, following Lehman Brothers' failure the day before AIG was bailed out, a money market mutual fund with more than $60 billion in assets, the Reserve Primary Fund, broke the buck. The value of the company's $785 million in holdings of Lehman Brothers dropped to zero, which triggered large withdrawals from the fund, leading the value of a share in the fund to fall to 97 cents per $1 invested. Such an unanticipated drop in the value of what was supposed to be a safe investment created panic and led investors to withdraw their money from other money markets funds, even ones that had not invested in Lehman or AIG.

The CDS that AIG sold also created links between it and the large financial institutions that bought the swaps. Absent a bailout, the failure of AIG, or even the anticipation of such a failure, could have led to large losses for these institutions, as they would have lost the protection offered by the CDS contracts. Losses could then have spread to other large institutions connected to these institutions. One indication for the potential losses to AIG's counterparties is the amount of government aid ($49.5 billion) that went to AIG's CDS counterparties, including Societe Generale ($11 billion), Goldman Sachs ($8.1 billion), Deutsche Bank ($5.4 billion), and Merrill Lynch ($4.9 billion).[8]

FIGURE 1

Aid to AIG's CDS Counterparties

$, billions.



Securities Lending

Another nontraditional activity that contributed to AIG's failure was securities lending. In securities lending, a financial institution such as an insurance company lends a security to another financial institution in exchange for collateral, typically cash. The borrower generally can return the borrowed security to the lender and receive its collateral back on short notice, without penalty.[9] As long as the lender, in this case the insurance company, invests the cash collateral in conservative short-term assets, there is no risk to financial stability, because the insurance company is able to return the cash collateral to the borrower on a short notice. However, a risk arises when the securities lender invests the cash collateral in long-term and less-liquid assets such as corporate bonds or mortgage-backed securities. The AIG case illustrates this risk.

AIG loaned securities, primarily corporate bonds, to banks and broker dealers. Between 2005 and 2007, rather than invest the cash collateral it received from the borrowers in conservative, short-term securities, without notice AIG changed the direction of its investment strategy and invested a substantial portion of the cash collateral in long-term illiquid assets such as mortgage-backed securities, other asset-backed securities, and collateralized debt obligations, whose payoffs depended on the health of the housing market. At the end of 2007, 65 percent of AIG's securities lending collateral was invested in such securities, and only 16 percent was in cash or other short-term investments.[10] As the value of these securities dropped, and as AIG's losses on its CDS portfolio mounted, the borrowers in AIG's securities lending portfolio wanted to reduce their exposure to AIG, and so they began to return the borrowed securities to AIG and demand the return of their cash collateral. Between just September 12 and September 30, 2008, securities lending counterparties

demanded that AIG return approximately $24 billion in cash.[11] In other words, AIG experienced a run.

A run triggered by securities lending is a concern to financial stability because it forces the insurance company to sell its assets quickly at fire-sale prices, leading to losses for the insurance company.[12] Other financial institutions that hold the same class of assets may then have to mark down the value of their assets, which could force them to sell assets quickly to ensure that their capital does not fall below the minimum level required by the regulator. As more companies sell assets, the reduction in asset prices is amplified, which can affect the whole economy. For instance, when the value of their assets drops, financial institutions may be reluctant to make loans to businesses and consumers.[13]

Securities lending also creates direct links between the insurance company and other financial institutions, which can further spread losses to the rest of the financial system. The borrower faces a counterparty risk that the insurance company will be unable to return the collateral. So the failure of the insurance company may spread to the borrower and other firms that are connected to the borrower. Indeed, $43.7 billion of AIG's government aid went to AIG's securities lending counterparties.[14]

Insurance companies, mostly life insurers, continue to engage in securities lending. Moreover, life insurance companies continue to invest a large portion of the cash collateral received in potentially illiquid long-term assets, such as corporate bonds and private-label asset-backed securities (Figures 2 and 3). Empirical evidence suggests that securities lending by life insurers is at least partially driven by a desire to take on more risk.[15] Insurance companies also sell other financial products that could expose them to runs.[16]

Captive Reinsurance

A final example of a nontraditional activity that could pose risks to financial stability is captive reinsurance. In a typical captive reinsurance transaction, the insurance company obtains insurance from an affiliated ("captive") company that is subject to lower reserve and capital requirements and that in most cases is not required to file public financial statements or follow the same regulatory accounting practices as primary insurers. Thus, captive reinsurance allows the insurance company as a whole to hold less capital, even though there is no reduction in risk. (The company that purchases reinsurance is called the ceding company: It cedes its liabilities to the reinsurer.)

Captive reinsurance grew rapidly from $90 billion in 2002 to $572 billion in 2012 (Figure 4).[17] Initially, the growth in captive reinsurance was mainly in life insurance products and was probably triggered by a new regulation requiring insurance companies to hold more reserves against these products.[18] New state laws after 2002 allowed life insurers to establish captives to circumvent these new reserve requirements. Since 2007, captive reinsurance for annuity products has also grown rapidly, even though reserve requirements for these products were not changed.

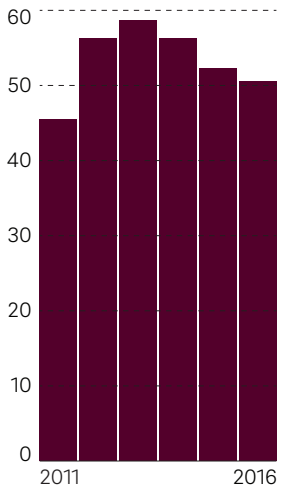
Particularly worrisome is the rapid growth in shadow insurance, in which the captive is not supervised by the ceding company's state and has not been rated by an insurance rating agency.[19] Shadow insurance grew from $11 billion in 2002 to $370 billion in 2013 (Figure 5). States compete for captive business to increase employment and tax revenue. The state where the captive is located does not directly bear risk, because when a captive fails, the liabilities revert to the operating company and, ultimately, to the guarantee associations operated by the states in which the policies were sold. Since 2009, the growth of shadow insurance has slowed, partly because of more

FIGURE 2

Life Insurers Remain Involved in Securities Lending

U.S. life insurance industry securities lending.

$, billions

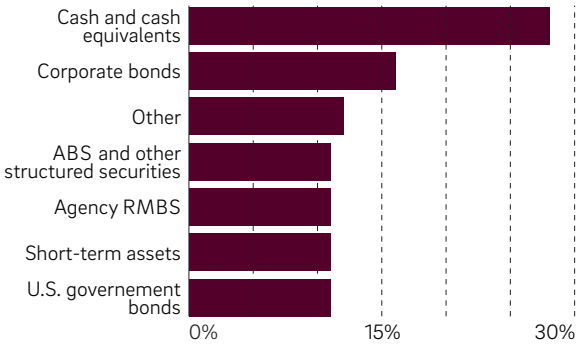


Source: SNL Financial.

FIGURE 3

Much Collateral Is Reinvested in Illiquid Assets

% of total collateral reinvested, 2015



Source: National Association of Insurance Commissioners, http://www.naic.org/capital_markets_archive/160909.htm.

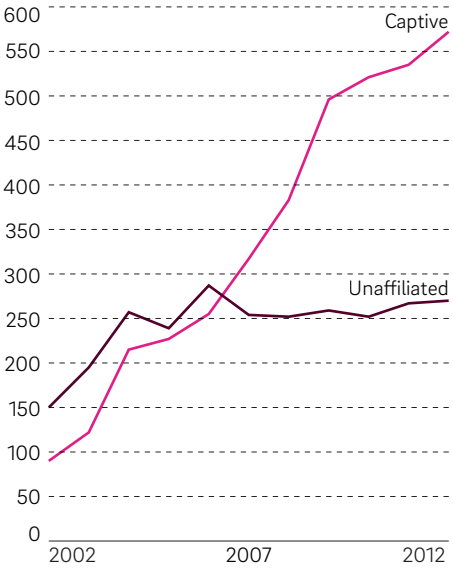
Note: Life insurance industry, as of December 31, 2015.

FIGURE 4

Rapid Growth in Captive Reinsurance

Total life and annuity products.

$, billions



Source: Koijen and Yogo, 2016.

regulatory scrutiny in states such as California and New York.[20]

When a captive reinsurer is unauthorized in a state, the ceding insurer may reduce its statutory reserves, and hence boost its capital, only if the reinsurer posts collateral or receives a third-party guarantee such as a letter of credit from a bank. However, as noted in a New York State Department of Financial Services report[21], in many cases the collateral was just a "contractual parental guarantee" in which the parent company was responsible to cover losses. So, the insurance company boosted its capital artificially without reducing risk.[22]

Captive insurance, and in particular, shadow insurance, poses concerns for financial stability. First, there is no real reduction of risk, yet the company as a whole holds less capital. This means that the company might be exposed to losses that it cannot handle. Second, the use of bank letters of credit as collateral exposes the insurance company to the risk that the bank will not renew its letter of credit; usually, these letters of credit have shorter maturities than the insurer's liabilities do. So, the banks issuing the letters of credit may run on the insurance company. Third, these letters of credit create links with banks, exposing banks to potential losses from the insurance industry.

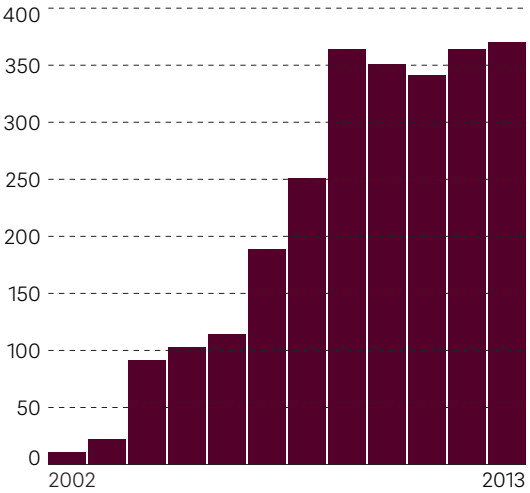
Should the Fed Help Regulate Insurers?

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, the Fed can impose

FIGURE 5

Surge in Shadow Insurance Is Particularly Worrisome

$ billions



Source: Koijen and Yogo, 2017.

Note: Shadow insurance refers to a subset of captive insurance.

Risks from Variable Annuities with Minimum Guarantees

Another nontraditional activity that has received much attention from policymakers and economists is the sale of variable annuities with minimum guarantees. This activity does not create direct links between insurers and other financial institutions, but it could expose insurers to large losses in the event of a deterioration in overall economic conditions.

A variable annuity is a hybrid of a traditional life annuity and a mutual fund. Variable annuities are long-term saving products. But in contrast to traditional annuities, policyholders' money is invested in mutual funds that fit their risk appetite. Their investment accounts are kept separate from the company's general account, and payments are drawn only from these separate accounts. So, while this product is riskier for the annuity holder, it poses no financial stability concerns.

However, things change when the variable annuity is joined with a minimum guarantee. A particular concern are the guaranteed living benefits, which are optional riders that policyholders can obtain for an additional fee, guaranteeing they will receive some minimum income (or be able to withdraw some minimum amount) regardless of how well their mutual fund investments actually perform. These guarantees, which are backed by the insurance company's general account assets, are a concern to financial stability because the insurance company provides protection against risks arising from worsening conditions in the overall economy. For example, these guarantees may kick in during an economic downturn, as when equity prices drop, adding stress to an already-stressed economy.

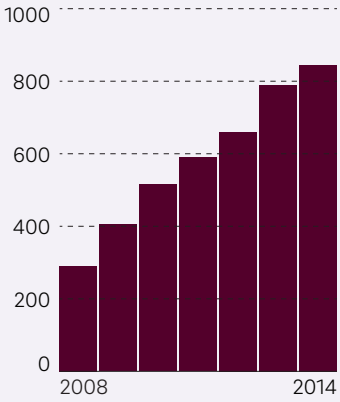
Indeed, as Ralph Koijen and Motohiro Yogo have documented, during the financial crisis in 2008, the variable annuity business experienced significant losses because of failing stock prices, high volatility, and low interest rates, with two companies, Hartford Life and Manulife Financial, losing about half of their capital and surplus. Across the industry, life insurers with variable annuity guarantees lost 9 percent of their capital and surplus, while those without guarantees gained 1 percent.

Since the crisis, the estimated total outstanding account value of all variable annuities with guaranteed living benefits has risen rapidly, from $292 billion in 2008 to $843 billion in 2014 (Figure 6). Rapid growth of an activity is a particular source of regulatory concern because it suggests that risks may not have been fully priced in.

FIGURE 6

Fast Rise in Variable Annuities with Minimum Guarantees

Dollar value of variable annuities with guaranteed living benefits.



Source: Financial Stability Oversight Council 2015 Annual Report/ LIMRA.

Note: Data based on a survey of domestic insurance companies.

stricter regulations on insurance companies and other nonbank financial institutions that the Financial Stability Oversight Council designates as systemically important (SIFI). A company can be designated as systemically important if material financial distress at the company, or the nature, scope, size, scale, concentration, interconnectedness, or mix of its activities could pose a threat to the financial stability of the United States.[23]

There have been calls to repeal the council's authority to designate firms as SIFIs.[24] One concern is that the council has too much discretion in designating an institution as a SIFI, which could result in arbitrary and inconsistent designations. Another concern is that market participants might interpret a SIFI designation as a signal that the government considers the institution too big to fail and will bail it out if it gets into trouble and the threat of contagion arises, which could create moral hazard by undermining market discipline. That is, if everyone expects the Fed to bail out a systemically important insurer, it will take excessive risks, and its policyholders and counterparties will have no incentive to monitor it closely or take steps to reduce that risk.

Another set of concerns involves the principle of state control. Some argue that Fed involvement is unnecessary because state regulation is adequate. Indeed, since the financial crisis, state regulators, in particular the National Association of Insurance Commissioners (NAIC), have taken steps to reduce risks in the insurance industry. Some proponents of state oversight see some role for the Fed, but only insofar as nontraditional activities that pose systemic risk, and support leaving the rest of insurers' activities to state regulators.[25]

The question for policymakers is how to weigh these concerns against the risk to financial stability from insurers' nontraditional activities. The Fed's mission includes guarding the stability of the U.S. financial system, and insurance companies are large institutions that play a large role in the economy. As we have seen, they engage in nontraditional activities that could pose a threat to financial stability, and there is evidence of their having engaged in risk-taking and regulatory arbitrage–which make their potential threat to financial stability even larger. A quantitative measure of systemic risk, SRISK,[26] that estimates a financial institution's capital shortfall during a crisis, ranks insurance companies among the most systemically risky financial institutions in the U.S.[27] Interestingly, since 2008, SRISK has declined significantly for large banks but has increased for large insurance companies except AIG (Figure 7).

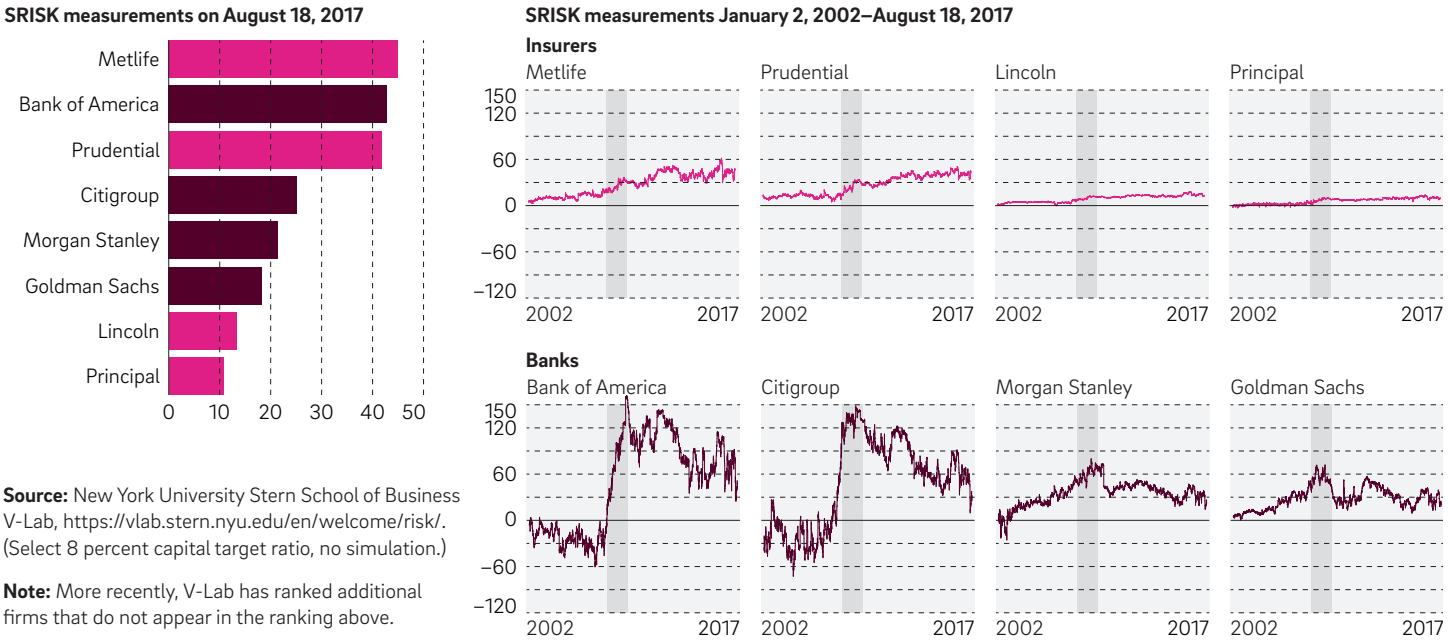
*See **Risk-Taking and Regulatory Arbitrage in the Insurance Industry.***

Those who argue that federal regulation is necessary note that an individual insurance company does not take into account the negative consequences of its failure on the rest of the economy. Likewise, an individual state does not take into account the consequences of its actions for other states. Individually or collectively, the states are not responsible for the stability of the U.S. financial system. The aforementioned desire to preserve states' longstanding role in insurance regulation has led to a search for a middle ground that would feature federal regulation of insurers' nontraditional activities and state regulation of traditional insurance activities. Unfortunately, state-federal regulation may prove difficult in practice, as nontraditional and traditional insurance activities are deeply intertwined. For example, insurers use general account assets to back both

FIGURE 7

Insurers Among Most Systemically Risky U.S. Financial Firms

SRISK capital shortfall if the S&P 500 index falls more than 40 percent over the next six months, $ billions.



Source: New York University Stern School of Business V-Lab, https://vlab.stern.nyu.edu/en/welcome/risk/. (Select 8 percent capital target ratio, no simulation.)

Note: More recently, V-Lab has ranked additional firms that do not appear in the ranking above.

minimum guarantees for variable annuities and traditional insurance policies. Similarly, insurance companies lend securities from their general accounts.

Proponents of retaining the council's authority to designate firms as SIFIs maintain that discretion is necessary because assessing systemic risk is too complicated to be captured by fixed rules. Indeed, one benefit of discretion is that it allows decisions to be made based on information that applies to the case at hand.

But will SIFI designations undermine market discipline? The concern that an inferred bailout will relax attitudes about risk is widely shared. Yet, market participants may already expect any large financial institution to be bailed out, regardless of whether it is formally designated a SIFI. The best solution from a social point of view might be to not completely rule out bailouts but instead to monitor and regulate SIFIs closely to reduce moral hazard. The Fed could also shift more of the onus onto systemically important institutions by taxing SIFIs to account for the risk they pose to the economy and the costs of potential bailouts.[29] An example of such a tax is the SIFI capital surcharge rule.[30]

A final potential concern that is less often raised is whether the Fed should focus only on large insurance companies. As we saw earlier, they are not the only ones that engage in nontraditional activities that could pose a threat to financial stability. The aggregate potential threat to financial stability from the nontraditional activities of numerous small insurers could be of the same magnitude as the threat from the activities of a single large company. EI

Risk-Taking and Regulatory Arbitrage in the Insurance Industry

Captive insurance is an example of regulatory arbitrage: A company is able to hold less capital without having to actually reduce its risk. There is other evidence that insurance companies have engaged in risk-taking and regulatory arbitrage.

One study by Ralph Koijen and Motohiro Yogo showed that around December 2008, insurance companies took actions that created losses to make them look good for regulatory purposes. Life insurers were able to make accounting profits by selling policies at prices that were far below actuarial fair values because the amount of reserves they had to record on their balance sheets to cover the future liabilities created by the new policies was less than their selling price. So, insurance companies sold policies that technically lost money but made accounting profits.[28]

In another study, Bo Becker and Victoria Ivashina showed that within a group of bonds with the same credit rating, insurance firm portfolios tended to hold the riskier ones.

Another sign of regulatory arbitrage comes from evidence by Becker and Markus Opp that insurance companies invested more in mortgage-backed securities following new regulations that substantially reduced capital requirements on such investments.

Notes

1 To learn more about some of the channels of contagion, read my *Business Review* article on financial contagion and network design.

2 In a catastrophic disaster such as a hurricane, the property-casualty insurance industry can suffer large losses that it cannot handle on its own, and so the government might need to intervene.

3 Note, however, that insurance companies provide an important source of funding for banks through the corporate bond market. A reduction in their supply of funding to banks could lead to liquidity problems for banks, at least in the short run.

4 In CDS contracts as in most derivative contracts, counterparties post collateral, often in the form of cash. The larger one party's obligation to the other, the more collateral it will be required to post.

5 Robert McDonald and Anna Paulson discuss AIG's credit default swaps operations in more detail. They document that the amount of cash collateral that AIG needed to post increased rapidly, from $15.8 billion at the end of June 2008, to $33.9 billion on September 16, the day the Fed stepped in. The difference between the amount of collateral that AIG was required to post and the amount it actually posted increased from $2.5 billion to $11.4 billion during that same time.

6 Note that under the traditional insurance model, insurance companies do not need to borrow short term, so there should not be much exposure between money market funds and insurers.

7 Under new SEC regulations, in money market funds used by institutional investors, the daily price can fluctuate along with changes in the market-based value of the fund assets. See more details at https://www.sec.gov/news/press-release/2014-143.

8 See the documentation of AIG's payments to counterparties accompanying the 2009 *New York Times* article by Mary Williams Walsh.

9 The main lenders of securities are institutional investors, such as retirement and pension plans, mutual funds, and insurance companies, the last of which accounted for roughly 5 percent of total lending in 2014. The main borrowers are hedge funds, broker-dealers, derivative traders, and market makers. Borrowers may use the borrowed security as part of a short-selling strategy or to deliver a particular security to a customer when they do not have the security on hand.

10 Nineteen percent was invested in corporate bonds.

11 See p. 45 of the Congressional Oversight Panel Report.

12 For evidence of fire sales in the insurance industry, see the papers by Andrew Ellul, Chotibhak Jotikasthira, and Christian Lundblad and by Craig Merrill, Taylor Nadauld, René Stulz, and Shane Sherlund.

13 For theoretical models that analyze this issue in more depth, see the papers by Kiyotaki and Moore and by Brunnermeier and Pederson. In a 2017 working paper, Nathan Foley-Fisher, Stefan Gissler, and Stephane Verani demonstrate another side effect of the collapse of AIG's securities lending programs in 2008: a substantial and long-lasting reduction in the market liquidity of corporate bonds that were predominantly held (and hence lent) by AIG.

14 See the interactive documents accompanying the 2009 *New York Times* article.

15 In their 2016 paper on securities lending, Foley-Fisher, Borghan Narajabad, and Verani show that insurers that engaged aggressively in maturity transformation with respect to the cash collateral they received from securities lending tended to switch to repo financing—a form of short-term collateralized borrowing—when borrowers' demand was low for the securities loaned (typically corporate bonds).

16 One example is extendible funding agreement-backed notes that insurance companies sell to institutional investors. See the 2016 paper on self-fulfilling runs by Foley-Fisher, Narajabad, and Verani. See also the Chicago Fed Letter by Robert McMenamin, Zain Mohey-Deen, Anna Paulson, and Richard J. Rosen.

17 See Ralph Koijen and Motohiro Yogo's 2016 paper.

18 In January 2000, the National Association of Insurance Commissioners (NAIC) adopted Model Regulation 830, commonly referred to as Regulation XXX. This was followed by Actuarial Guideline 38 in January 2003, commonly referred to as Regulation AXXX.

19 Specifically, by A.M. Best Company, which is a rating agency that focuses on the insurance industry.

20 In their 2017 book chapter, Koijen and Yogo show that in 2013, captive insurance was $617 billion, and shadow insurance was $370 billion. We do not have more recent data at this point.

21 See the report by Benjamin M. Lawsky.

22 The report mentions another way in which shadow insurance allows insurers to boost their capital artificially: The reinsurer pays a commission to the original insurer, which can then boost its capital artificially by recording these commissions as "retained earnings." So the company increases its capital by essentially paying itself.

23 Dodd–Frank also specifies some of the factors that the council needs to consider, including leverage, off-balance-sheet exposure, relationships with other significant companies, the company's liabilities and its degree of reliance on short-term funding, and the importance of the company as a source of credit for households, businesses, and state and local governments, and as a source of liquidity for the United States financial system.

24 For example, the Financial Choice Act of 2017 has called for the abolition of the SIFI designation.

25 See, for example, the paper by Scott Harrington.

26 Specifically, SRISK estimates how much capital a firm will be short, relative to some target level of capital (8 percent) if a broad market index falls by more than 40 percent over the next six months. SRISK is updated weekly on New York University Stern School of Business's V-Lab website: https://vlab.stern.nyu.edu/en/welcome/risk/.

27 SRISK applies only to publicly traded companies and hence does not include some large U.S. life insurers such as TIAA-CREF, New York Life, and Northwestern Mutual Life.

28 See Koijen and Yogo's 2015 article.

29 This idea is formulated in the paper by Viral V. Acharya, Lasse H. Pedersen, Thomas Philippon, and Matthew Richardson.

30 For more details on the SIFI capital surcharge rule, see https://www.federalreserve.gov/newsevents/pressreleases/bcreg20150720a.htm.

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Research Update

These papers by Philadelphia Fed economists, analysts, and visiting scholars represent preliminary research that is being circulated for discussion purposes.

The views expressed in these papers are solely those of the authors and should not be interpreted as reflecting the views of the Federal Reserve Bank of Philadelphia or Federal Reserve System.

Strategic Default Among Private Student Loan Debtors: Evidence from Bankruptcy Reform

Bankruptcy reform in 2005 restricted debtors' ability to discharge private student loan debt. The reform was motivated by the perceived incentive of some borrowers to file bankruptcy under Chapter 7 even if they had, or expected to have, sufficient income to service their debt. Using a national sample of credit bureau files, the authors examine whether private student loan borrowers distinctly adjusted their Chapter 7 bankruptcy filing behavior in response to the reform. The authors do not find evidence to indicate that the moral hazard associated with dischargeability appreciably affected the behavior of private student loan debtors prior to the policy.

Supersedes Working Paper 15–17/R.
Working Paper 17–38. Rajeev Darolia, University of Kentucky and Federal Reserve Bank of Philadelphia Visiting Scholar; Dubravka Ritter, Federal Reserve Bank of Philadelphia Payment Cards Center.

The Aggregate Effects of Labor Market Frictions

Labor market frictions are able to induce sluggish aggregate employment dynamics. However, these frictions have strong implications for the source of this propagation: They distort the path of aggregate employment by impeding the flow of labor across firms. For a canonical class of frictions, the authors show how observable measures of such flows can be used to assess the effect of frictions on aggregate employment dynamics. Application of this approach to establishment microdata for the United States reveals that the empirical flow of labor across firms deviates markedly from the predictions of canonical labor market frictions. Despite their ability to induce persistence in aggregate employment, firm-size flows in these models are predicted to respond aggressively to aggregate shocks but react sluggishly in the data. This paper therefore concludes that the propagation mechanism embodied in standard models of labor market frictions fails to account for the sources of observed employment dynamics.

Working Paper 17–40. Michael W.L. Elsby, University of Edinburgh; Ryan Michaels, Federal Reserve Bank of Philadelphia Research Department; David Ratner, Federal Reserve Board of Governors.

Stuck in Subprime? Examining the Barriers to Refinancing Mortgage Debt

Despite falling interest rates and major federal policy intervention, many borrowers who could financially gain from refinancing have not done so. The authors investigate the rates at which, relative to prime borrowers, subprime borrowers seek and take out refinance loans, conditional on not experiencing mortgage default. They find that starting in 2009, subprime borrowers are about half as likely as prime borrowers to refinance, although they still shop for mortgage credit, indicating their interest in refinancing. The disparity in refinancing is driven in part by the tightened credit environment post-financial crisis, along with the fact that many subprime borrowers are ineligible for the Home Affordable Refinance Program (HARP), which is the major policy initiative designed to assist borrowers in refinancing their mortgages. The authors argue that these barriers to refinancing for subprime borrowers have long-term implications for social stratification and wealth building. These concerns are exacerbated by an additional finding of our work that refinance rates have been significantly lower for black and Hispanic borrowers, even after controlling for borrower credit status.

Working Paper 17–39. Lauren Lambie-Hanson, Federal Reserve Bank of Philadelphia Supervision, Regulation and Credit; Carolina Reid, University of California-Berkeley.

Model Secrecy and Stress Tests

Conventional wisdom holds that the models used to stress test banks should be kept secret to prevent gaming. The authors show instead that secrecy can be suboptimal, because although it deters gaming, it may also deter socially desirable investment. When the regulator can choose the minimum standard for passing the test, the authors show that secrecy is suboptimal if the regulator is sufficiently uncertain regarding bank characteristics. When failing the bank is socially costly, then under some conditions, secrecy is suboptimal when the bank's private cost of failure is either sufficiently high or sufficiently low.

Working Paper 17–41. Yaron Leitner, Federal Reserve Bank of Philadelphia Research Department; Basil Williams, New York University.

Long-Run Trade Elasticity and the Trade-Comovement Puzzle

The authors show that the trade-comovement puzzle—theory's failure to account for the positive relation between trade and business cycle synchronization—is intimately related to its counterfactual implication that short- and long-run trade elasticities are equal. Based on this insight, the authors show that modeling the disconnect between the low short- and the high long-run trade elasticity in consistency with the data is promising in resolving the puzzle. In a broader context, the authors' findings are relevant for analyzing business cycle transmission in a large class of models and caution against the use of static elasticity models in cross-country studies.

Working Paper 17–42. Lukasz A. Drozd, Federal Reserve Bank of Philadelphia Research Department; Sergey Kolbin, Amazon; Jaromir B. Nosal, Boston College.

Incumbency Disadvantage in U.S. National Politics: The Role of Policy Inertia and Prospective Voting

The authors document that postwar U.S. national elections show a strong pattern of "incumbency disadvantage": If the presidency has been held by a party for some time, that party tends to lose seats in Congress. The authors develop a model of partisan politics with policy inertia and prospective voting to explain this finding. Positive and normative implications of the model are explored.

Supersedes Working Paper 16–36.
Working Paper 17–43. Satyajit Chatterjee, Federal Reserve Bank of Philadelphia Research Department; Burcu Eyigungor, Federal Reserve Bank of Philadelphia Research Department.

The Paper Trail of Knowledge Spillovers: Evidence from Patent Interferences

The authors show evidence of localized knowledge spillovers using a new database of multiple invention from U.S. patent interferences terminated between 1998 and 2014. Patent interferences resulted when two or more independent parties simultaneously submitted identical claims of invention to the U.S. Patent Office. Following the idea that inventors of identical inventions share common knowledge inputs, interferences provide a new method for measuring spillovers of tacit knowledge compared with existing (and noisy) measures such as citation links. Using matched pairs of inventors to control for other factors contributing to the geography of invention and distance-based methods, the authors find that interfering inventor pairs are 1.4 to 4 times more likely to live in the same city or region. These results are not driven exclusively by observed social ties among interfering inventor pairs. Interfering inventors are also more geographically concentrated than inventors who cite the same prior patent. Our results emphasize geographic distance as a barrier to tacit knowledge flows.

Working Paper 17–44. Ina Ganguli, University of Massachusetts–Amherst; Jeffrey Lin, Federal Reserve Bank of Philadelphia Research Department; Nicholas Reynolds, Brown University.

Greed as a Source of Polarization

The political process in the United States appears to be highly polarized: evidence from voting patterns finds that the political positions of legislators have diverged substantially, while the largest campaign contributions come from the most extreme lobby groups and are directed to the most extreme candidates. Is the rise in campaign contributions the cause of the growing polarity of political views? In this paper, we show that, in standard models of lobbying and electoral competition, a free-rider problem amongst potential contributors leads naturally to a divergence in campaign contributors without any divergence in candidates' policy positions. However, we go on to show that a modest departure from standard assumptions—allowing candidates to directly value campaign contributions (because of "ego rents" or because lax auditing allows them to misappropriate some of these funds)—delivers the ability of campaign contributions to cause policy divergence.

Working Paper 18–01. Igor Livshits, Federal Reserve Bank of Philadelphia Research Department; Mark L.J. Wright, Federal Reserve Bank of Minneapolis, CAMA, NBER.

Redefault Risk in the Aftermath of the Mortgage Crisis: Why Did Modifications Improve More Than Self-Cures?

This paper examines changes in the redefault rate of mortgages that were selected for modification during 2008–2011, compared with that of similarly situated self-cured mortgages during the same period. We find that while the performance of both modified and self-cured loans improved dramatically over this period, the decline in the redefault rate for modified loans was substantially larger, and the authors attribute this difference to a few key factors. First, the modification terms regarding repayments have become increasingly more generous, including more principal reduction, resulting in greater financial relief to the borrowers. Second, modifications in later vintages also benefited from improving economic conditions. Modifications became more effective as unemployment rates declined and home prices recovered. Third, the authors find that the difference between redefault rate improvement between modified loans and self-cured loans continue to persist even after controlling for all the relevant risk and economic factors. They attribute this difference to the servicers' learning process—such as data collection and information sharing among industry participants—known as "learning-by-doing." Early in the mortgage crisis, many servicers had limited experience selecting the best borrowers for modification. As modification activity increased, lenders became more adept at screening borrowers for modification eligibility and in selecting appropriate modification terms. The authors' empirical findings suggest that mortgage modification effectiveness could be enhanced through the industry's "learning-by-doing" process.

Working Paper 18–02. Paul Calem, Federal Reserve Bank of Philadelphia Supervision, Regulation and Credit; Julapa Jagtiani, Federal Reserve Bank of Philadelphia Supervision, Regulation and Credit; Raman Maingi, Federal Reserve Bank of Philadelphia Supervision, Regulation and Credit; David Abell, Federal Reserve Bank of Philadelphia Supervision, Regulation and Credit.

Did the ACA's Dependent Coverage Mandate Reduce Financial Distress for Young Adults?

We analyze whether the passage of the Affordable Care Act's dependent coverage mandate in 2010 reduced financial distress for young adults. Using nationally representative, anonymized consumer credit report information, we find that young adults covered by the mandate lowered their past due debt, had fewer delinquencies, and had a reduced probability of filing for bankruptcy. These effects are stronger in geographic areas that experienced higher uninsured rates for young adults prior to the mandate's implementation. Our estimates also show that some improvements are transitory because they diminish after an individual ages out of the mandate at age 26.

Working Paper 18–03. Nathan Blascak, Federal Reserve Bank of Philadelphia Payment Cards Center; Vyacheslav Mikhed, Federal Reserve Bank of Philadelphia Payment Cards Center

The Economics of Debt Collection: Enforcement of Consumer Credit Contracts

Creditors often outsource the task of obtaining repayment from defaulting borrowers to third-party debt collectors. We argue that by hiring third-party debt collectors, creditors can avoid competing in terms of their debt collection practices. This explanation fits several empirical facts about third-party debt collection and is consistent with the evidence that third-party debt collectors use harsher debt collection practices than original creditors. Our model shows that the impact of third-party debt collectors on consumer welfare depends on the riskiness of the pool of borrowers and provides insights into which policy interventions may improve the functioning of the debt collection market.

Supersedes Working Paper 15–43.
Working Paper 18–04. Viktar Fedaseyeu, Bocconi University; Robert Hunt, Federal Reserve Bank of Philadelphia Consumer Finance Institute and Payment Cards Center.

Screening on Loan Terms: Evidence from Maturity Choice in Consumer Credit

We exploit a natural experiment in the largest online consumer lending platform to provide the first evidence that loan terms, in particular maturity choice, can be used to screen borrowers based on their private information. We compare two groups of observationally equivalent borrowers who took identical unsecured 36-month loans; for only one of the groups, a 60-month loan was also available. When a long-maturity option is available, fewer borrowers take the short-term loan, and those who do default less. Additional findings suggest borrowers self-select on private information about their future ability to repay.

Working Paper 18–05. Andrew Hertzberg, Federal Reserve Bank of Philadelphia Research Department; Andres Liberman, New York University; Daniel Paravisini, London School of Economics.

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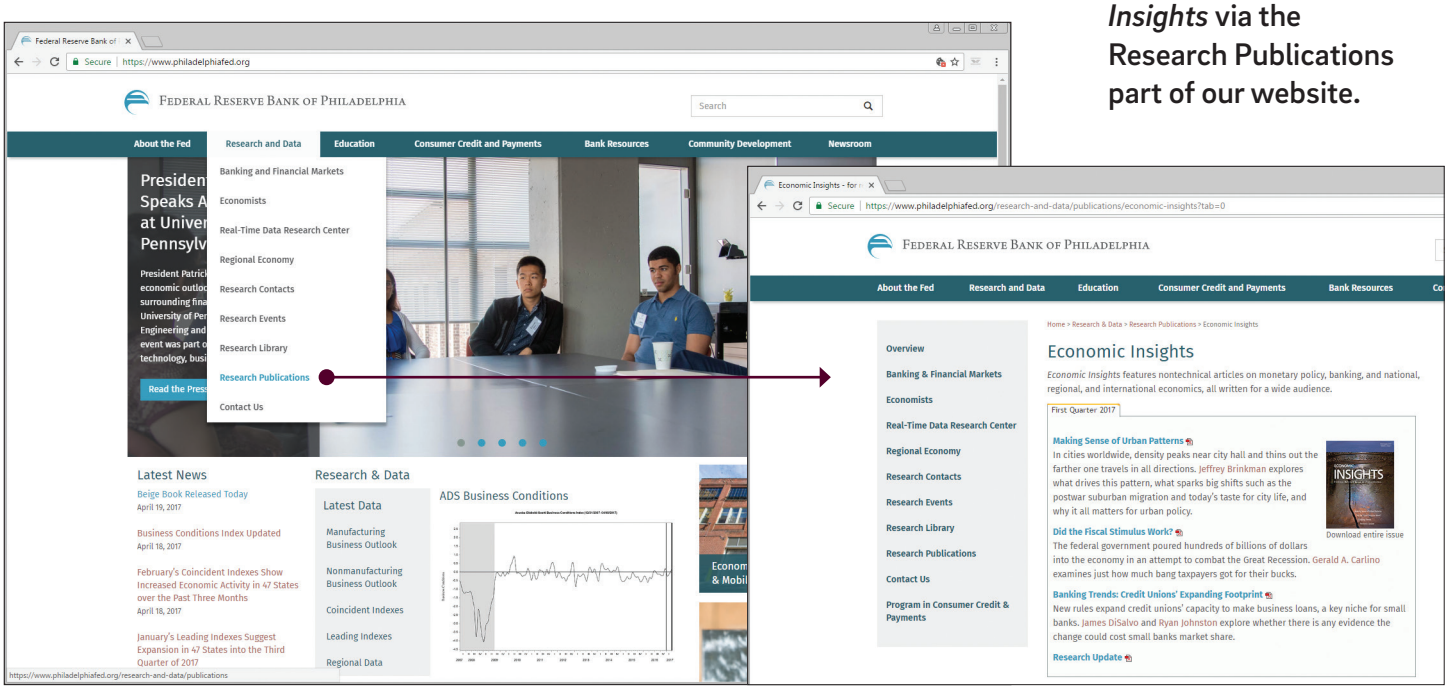
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