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The Refinancing Boom and the Financial Crisis

Three trends in the U.S. housing market combined to dramatically magnify the losses of homeowners between 2006 and 2008 and to increase the systemic risk in the financial system. Individually, these trends — rising home prices, falling mortgage rates, and more efficient refinancing — were neutral or positive for the economy. But together, they lured masses of homeowners to refinance their homes and extract equity at the same time (“cash-out” refinancing), increasing the risk in the financial system, according to **Amir Khandani, Andrew Lo, and Robert Merton**. Like a ratchet tool that could only adjust in one direction as home prices were rising, the system was unforgiving when prices fell. In **Systemic Risk and the Refinancing Ratchet Effect** (NBER Working Paper No. 15362), these researchers estimate that this refinancing ratchet effect could have generated potential losses of \$1.5 trillion for mortgage lenders from June 2006 to December 2008 — more than five times the potential losses had homeowners avoided all those cash-out refinancing deals.

Over the past twenty years, the growth and increasing efficiency of the refinancing business have made it

easier for Americans to take advantage of falling interest rates and/or rising home values. Other researchers have noted the declining equity that homeowners had in their homes, chalking

“Rising home prices, falling mortgage rates, and more efficient refinancing...lured masses of homeowners to refinance their homes and extract equity at the same time, increasing systemic risk in the financial system.”

up much of it to the popularity of cash-out refinancing, home-equity lines of credit, and outright sales of homes to extract equity. These authors concentrate on the previously unstudied interplay of this growth in refinancing with falling interest rates and rising home values. Benign in isolation, the three trends can have explosive results when they occur simultaneously. “We show that refinancing-facilitated home-equity extractions alone can account for the dramatic increase in systemic risk posed by the U.S. residential housing market, which was the epicenter of the Financial Crisis of 2007–2008.”

Using a model of the mortgage market, this study finds that had there been no cash-out refinancing, the total value of mortgages outstanding by December 2008 would have

reached \$4,105 billion on real estate worth \$10,154 billion for an aggregate loan-to-value ratio of about 40 percent. With cash-out refinancing, loans ballooned to \$12,018 billion on

property worth \$16,570 for a loan-to-value ratio of 72 percent.

When home values began to fall, lenders and borrowers had trouble reducing their risk exposures for two reasons. First, frequent cash-out refinancing changed the normal mix of mortgage-holders and created an unintentional synchronization of homeowner leverage and mortgage duration, causing correlated defaults when the problem hit. Second, once a home is bought, the debt can't be incrementally reduced because homeowners can't sell off portions of their home — homes are indivisible and the homeowner is the sole equity holder in the house.

This ratchet effect can create a dangerous feedback loop of higher-than-normal foreclosures, forced sales, and, ultimately, a market crash. With

home values falling from the peak of the market in June 2006, the study's simulation suggests that some 18 percent of homes were in negative-equity territory by December 2008. Without cash-out refinancing, that figure would have been only 3 percent.

"The most insidious aspect of this phenomenon is its origin in three benign market conditions, each of which is usually considered a harbinger of economic growth," the authors write. "[T]heir role in fostering economic growth makes it virtually

impossible to address the refinancing ratchet effect within the current regulatory framework."

—Laurent Belsie

The Consumer Response to the 2007 Toy Recalls

In 2007, the Consumer Product Safety Commission (CPSC) issued 276 recalls of toys and other children's products—an 80 percent increase over the number of children's items recalled in 2006. Many of the 2007 recalls involved paint with excessively high levels of lead content and almost all of the recalled toys were manufactured in China. This period of recalls attracted substantial media attention and, according to consumer surveys, resulted in significant consumer uncertainty about the safety of toys in general. The furor led to the passage of new safety regulations in the Consumer Product Safety Improvement Act of 2008.

In **Product Recalls, Imperfect Information, and Spillover Effects: Lessons from the Consumer Response to the 2007 Toy Recalls** (NBER Working Paper No. 15183), co-authors **Seth Freedman, Melissa Schettini Kearney, and Mara Lederman** investigate how these recalls affected consumer demand for toys during the Christmas season that followed. In addition to studying the direct effects of recalls, the researchers also examine whether—and to what extent—recall announcements had spillover effects to non-recalled items. The recalls here involved a shared industry practice—in this case, production in China—so they had the potential to result in significant negative spillovers.

The authors use sales data from the market research firm NPD Group to track sales of "Infant/Preschool" toys from 2005 through 2007. They find that manufacturers' 2007 Christmas

The study also finds that companies who did not have any recalls saw substantial sales losses—their 2007 Christmas season toy sales were down about 25 percent compared to 2005.

"A relatively small number of recalls by a few large manufacturers appears to result in decreased sales and capital market losses for the segment as a whole."

season sales of toys in categories that experienced recalls were down by about 30 percent, compared to other toys that these manufacturers sold (that is, a manufacturer who recalled a toy in the "Vehicles" category experienced a decrease in sales of toys in that category, relative to its other categories). But, the manufacturers' sales of toys that were sufficiently dissimilar to those named in the recalls did not seem to be negatively affected. In other words, in response to a recall, consumers did not appear to be "punishing" the manufacturer more generally. This would be consistent with consumers not drawing inferences about product quality at the manufacturer level, or, it could be that consumers do not recognize that dissimilar toys are produced by a common manufacturer. It could also be that manufacturers made costly investments in rebuilding their brand name, in which case the recalls would be imposing costs on these manufacturers, just not in the form of sales losses across categories.

Given that sales of other consumer products over this period (for example, books and video games) generally were not falling, this suggests that these recalls influenced consumers' expectations of toy safety in general.

The spillover effect of the recalls also hurt the market value of publicly-traded toy companies. An index created by the authors to track the stock market value of companies facing recalls fell 25.6 percent by year-end 2007 from the earliest round of recalls in May of that year. The index of toy firms not facing recalls fell 7.6 percent in the same period. The finding that a relatively small number of recalls by a few large manufacturers appears to result in decreased sales and capital market losses for the segment as a whole suggests that, from an industry perspective, investments in safety may be too low. When a shared industry practice is involved, such as production in China in the case of the toy recalls, the potential for spillover effects appears to be especially large.

—Frank Byrt

Where You Are Sent and for How Long Influences Post-Traumatic Stress Disorder

Recent research suggests that the wars in Afghanistan and Iraq, also known as Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), pose substantial mental health challenges to U.S. military service members and the mental health systems that serve them. Estimates of military service related post-traumatic stress disorder (PTSD) vary widely, from 4 percent to 45 percent depending on the samples and how PTSD was measured. PTSD is associated with a host of long-term family and workplace problems and often goes along with other psychiatric and physical disorders.

In **The Effect of OEF/OIF Deployment Intensity on the Rate of Posttraumatic Stress Disorder Among Active Duty Population** (NBER Working Paper No. 15203), authors **Yu-Chu Shen, Jeremy Arkes, Boon Wah Kwan, Lai Yee Tan, and Thomas Williams** estimate what the rates of PTSD are for various service groups and deployment experiences. The researchers use a random sample

based on all active duty enlisted personnel serving anywhere in the world between 2001 and 2006, and examine the four services (Army, Marines, Navy, and Air Force) individually. They find

“Those deployed to Iraq/Afghanistan have much higher odds of developing PTSD compared to those in other missions — from an odds ratio of 1.3 for the Air Force to 9.1 for the Navy.”

that the percentage of PTSD diagnoses among the active duty population varies by service. This percentage is less than 1 percent in all four services for those who are *not* deployed on OEF/OIF missions. Those deployed to Iraq/Afghanistan have a much higher probability of developing PTSD — from 1.3 percent for the Air Force to 6.5 percent for the Navy. Controlling for relevant background characteristics, the researchers find that deployment to Iraq/Afghanistan increases the odds of developing PTSD substantially, with the odds ratio ranging from 1.25 for the Air Force to 9.06 for the Navy. Tour length also appears to matter: a deployment lasting longer than 180 days as

compared to a short tour increases the odds of PTSD by 1.11 times to 2.84 times, depending on the service. For both the Army and the Navy, a deployment to Iraq/Afghanistan fur-

ther exacerbates the adverse effect of tour length.

The Department of Defense has been addressing PTSD. It introduced the Post-Deployment Health Reassessment (PDHRA) in March 2005, and it mandates the completion of this re-assessment at 90–180 days after a deployment. However, the authors’ data show that almost 75 percent of the PTSD population in their sample was not diagnosed with PTSD until 200 days after their last deployment. The average lapse between the last deployment and the first diagnosis of PTSD was 291 days.

—Lester Picker

Low Life Expectancy in the United States

According to the World Health Organization (WHO), the United States ranked 29th in the world in 2006 in life expectancy at age 50. That places it more than three years behind the world’s leader, Japan, and more than one and a half years behind Australia, Canada, France, Italy, Iceland, Spain, and Switzerland. About 4 million Americans reach the age of 50 each

year, so an average loss of one and a half years per person means an aggregate loss of some 6 million years of potential life, valued at anywhere from \$600 billion to \$1.3 trillion annually.

In 2007, the United States spent 16 percent of its GDP on health care, by far the highest fraction of any country. The conclusion that is often drawn from these numbers is that the U.S.

health care system is extremely inefficient. In **Low Life Expectancy in the United States: Is the Health Care System at Fault?** (NBER Working Paper No. 15213), **Samuel Preston** and **Jessica Ho** conclude that it is not. The authors demonstrate that mortality reductions from prostate and breast cancers have been exceptionally rapid in the United States relative

to a set of peer countries. They argue that these unusually rapid declines are attributable to wider screening and more aggressive treatment of these diseases. Screening for other cancers also appears unusually extensive, and five-year survival rates from all of the major cancers are very favorable. Survival rates following heart attack and stroke are also favorable (although one-year survival rates following stroke are only average), and the proportion of people with elevated blood pressure or cholesterol levels who are receiving medication is well above European standards.

These performance indicators pertain primarily to what happens *after* a disease has developed, though. It is possible that the U.S. health care system performs poorly in preventing disease in the first place. Unfortunately, there are no satisfactory international comparisons of disease incidence. Some researchers report a higher prevalence of cancer and cardiovascular disease in the United States than in Europe, and biomarkers confirm that many dis-

ease syndromes are more prevalent in the United States than in England and Wales, for example. Higher dis-

“The low longevity ranking of the United States is not likely a result of a poorly functioning health care system.”

ease prevalence is *prima facie* evidence of higher disease incidence, although those high incidence rates also could be produced by better identification (for example, through screening programs) or better survival. The history of exceptionally heavy smoking and the more recent increase in obesity in the United States suggest that a high disease incidence cannot be laid entirely at the feet of the health care system.

Evidence that the major diseases are effectively diagnosed and treated in the United States does not mean that there may not be great inefficiencies in the U.S. health care system, according to the authors. A list of prominent inefficiency charges levied against the system include: fragmentation, duplication, inaccessibility of records, the

practice of defensive medicine, misalignment of physician and patient incentives, limitations of access for a

large fraction of the population, and excessively fast adoption of unproven technologies. Some of these inefficiencies have been identified by comparing performance across regions of the United States, but the fact that certain regions do poorly relative to others does not imply that the United States on the whole does poorly relative to other countries. The authors also note that many of the documented inefficiencies of the U.S. health care system simply add to its costs rather than harming patients.

They conclude that the low longevity ranking of the United States is not likely a result of a poorly functioning health care system.

—Lester Picker

The Repo Market and the Start of the Financial Crisis

The financial panic of 2007–8 stemmed from a run on the repurchase or “repo” market — the primary source of funds for the securitized banking system — rather than a run on monetary deposits as in earlier banking panics, according to a recent study by **Gary Gorton** and **Andrew Metrick**. Repo is a form of banking in which firms and institutional investors “deposit” money, by lending for interest, short term, and receive collateral as a guarantee. The authors define “securitized banking” as the creation of structured bonds from bank loans, such as mortgages, which are then used as collateral for repo. In **Securitized Banking and**

the Run on Repo (NBER Working Paper No. 15223), they argue that securities created from loans that originated in the subprime mortgage market played a major role in inciting the event, but that ultimately it was the loss of liquidity at the firms that were the biggest players in the securitized banking system that led to the financial crisis.

Prior to the panic, securitized banking was a \$12 trillion business practiced by the nation’s largest investment houses, including Bear Stearns, Lehman Brothers, Morgan Stanley, and Merrill Lynch, as well as by commercial banks such as Citigroup, J.P.

Morgan, and Bank of America, as a supplement to their traditional banking activities. Buyers of securitized bonds, often made up of mortgages, receive protection from the seller in the form of a repo agreement: the investor buys some asset representative of collateral from the bank for a set amount and the bank agrees to repurchase that same asset some time later at an agreed upon price. The percentage earned by the investor on that collateral, which sometimes is made up of other securitized bonds, is analogous to the interest rate on a bank deposit — it is known as the “repo rate.” Typically, the total amount of the deposit will

be somewhat less than the value of the underlying asset, with the difference called a “haircut.” That liability forces banks to keep some fraction of their assets in reserve when they borrow money through the repo markets.

The authors study spreads on 392 securitized bonds and related assets that are typically used in repo transactions. They track these market prices, over the period 2007–8. Among the market variables that they follow are ABX indices, which track the fundamentals of the subprime market, and the “LIB-OIS” spread—that is, the interest rate difference between the 3-month LIBOR (London Interbank Overnight Rate), which tracks the interest rate paid on unsecured interbank loans, and the overnight index swap (OIS) rate, which tracks the derivatives used in repo transactions. That LIB-OIS spread is believed to be a proxy for fears about bank solvency. Changes in the LIB-OIS spread represent counterparty risk, which is strongly correlated with changes in credit spreads and repo rates for securitized bonds.

Based on their analysis, the authors hypothesize that when the subprime real estate market weakened early in 2007, repo market buyers grew anxious about the quality of the securitized assets in the bonds and the

increasing haircuts on deals. Although some banks raised capital by issuing new securities in response, those efforts soon fell short because of slumping real estate, and mortgage, prices. This was exacerbated by the forced selling of underlying collateral, which in

“The loss of liquidity at the firms that were the biggest players in the securitized banking system ... led to the financial crisis.”

turn reinforced the cycle of declining asset values and increasing haircuts. By August 2007, market fears reached a critical mass that led to the first run on repo. Lenders were no longer willing to provide short-term financing at historical spreads, and repo haircuts jumped to new highs, tantamount to massive withdrawals from the banking system. There was even a cessation of repo lending on many types of assets, and a rapid increase in the LIB-OIS spread signaled increasing danger in the interbank market.

While the authors cannot explain why these events occurred precisely when they did, they argue that this sequence of events put a crimp in the securitized banking cycle, which requires all steps to run without interruption in order to function smoothly. With shrinking equity bases stretched by increasing haircuts, even on highly-rated collateral, concerns about banks’

liquidity came to the fore. In addition to dealing with the run on repo, banks were among the biggest investors in the market—they owned some of the bonds that they had created in the past, as well as recently-issued mortgages that they intended to securitize.

The next surprise to the industry was the government’s forced rescue of Bear Stearns in March 2008. As the contagion spread to highly-rated credit securities unrelated to the subprime markets, the entire securitized-banking model came under increasing pressure. The ABX indices spread continued its steady rise, resulting in prices of pennies on the dollar for subprime securities. The rise in the LIB-OIS spread continued to record levels, which telegraphed the potential collapse of the interbank market.

In the second half of 2008, the full force of the panic hit asset markets, financial institutions, and the rest of the nation’s economy. That ultimately contributed to the second systemic shock in September 2008, the failure of Lehman Brothers, the bailout of AIG, and the government takeover of Fannie Mae and Freddie Mac.

— Frank Byrt

International Differences in Decentralization and Productivity

In **The Organization of Firms across Countries** (NBER Working Paper No. 15129), co-authors **Nicholas Bloom, Raffaella Sadun, and John Van Reenen** collect the first international data on the decentralization of investment, hiring, production, and sales decisions from corporate headquarters to local plants.

They survey managers in almost 4,000 medium-sized manufacturing firms in the United States, Europe, and Asia. They find that social capital—as proxied by regional trust of other people in society—can improve aggregate productivity by facilitating greater decentralization of firms. Trust appears to facilitate delegation, with higher trust

between CEOs and middle-managers leading to more decentralized decision making.

For several reasons, countries in which firms decentralize gain economically. First, in those countries it is easier for more efficient firms to grow. Decentralization is essential for the creation of large firms, because CEOs

are otherwise constrained in the number of decisions they can make directly—it is therefore critical for enabling productive firms to grow large and to take market share from unproductive ones. Because trust is strongly linked with more decentralization, it in turn affects productivity. The absence of trust, in developing countries like Brazil, China, and India, explains why productive firms do not grow large and drive out unproductive firms from the market place.

Second, economies with low trust tend to specialize in industries where decentralization is less important. If some industries require high levels of decentralization in the organization—for example, complex electronics—then these industries will tend to locate in countries with high levels of trust. These may also be particularly productive industries. By contrast, industries that limited decentralization—like basic woodwork industries—will tend to develop in lower trust countries.

Third, greater trust appears to

encourage both cross-country trade and cross-country investment. Multi-national firms have a greater need to decentralize to foreign affiliates because of the local managers' better informa-

“Social capital—as proxied by regional trust—can improve aggregate productivity by facilitating greater decentralization of firms.”

tion, but they will be reluctant to do so when they do not trust the local management.

Finally, decentralization seems to directly influence within-firm productivity. One reason is that in highly centralized firms, many decisions do not get made because CEOs do not have the time to make them, and other managers do not have the authority to do so. For example, production management meetings happen less frequently in centralized firms because the CEO needs to attend but is too time-constrained to participate.

In addition to regional trust, three other factors stand out in explaining decentralization: rule of law, less hierarchical religion, and product mar-

ket competition. The authors find that countries with better protection of the rule of law are characterized by more decentralized plants, arguably because efficient law enforcement reduces the

probability that local managers will abuse their authority. Plants in locations with a high share of hierarchical religions are significantly more centralized, which is potentially attributable to a lower taste for decision making authority by local managers. Decentralization is also positively correlated with product market competition, possibly because of the greater importance of local knowledge in competitive environments, or because of disciplining effects that reduce the need for central monitoring. Together, social capital, rule of law, religious structure, and product market competition account for four-fifths of the cross-country variation in decentralization.

— Claire Brunel

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