

Who Neglects Risk? Investor Experience and the Credit Boom*

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Abstract

Many argue that overoptimistic thinking on the part of lenders helps fuel credit booms. We use new micro-data on mutual funds' holdings of securitizations to examine which investors are susceptible to such boom-time thinking. We show that firsthand experience plays a key role in shaping investors beliefs. During the 2003 to 2007 mortgage boom, inexperienced fund managers loaded up on securitizations linked to nonprime mortgages, accumulating twice the holdings of more seasoned managers by 2007. Moreover, inexperienced managers who *personally* experienced severe or recent adverse investment outcomes behaved more like seasoned managers. Our findings suggest a path-dependent view of credit booms: booms follow periods of tranquility, both because fewer investors have personally experienced credit market disruptions and because memories of past disruptions fade over time.

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There is nothing new except what is forgotten.—Rose Bertin

I. Introduction

Some observers argue that overly optimistic thinking on the part of lenders helps to fuel credit booms and sow the seeds of financial crises. Such “Goldilocks” thinking is most likely to take hold following periods of credit market tranquility because investment decisions “reflect the past and, in particular, the recent past, and how experience is transformed into expectations” (Minsky [1986]). As lenders buy into the boom-time belief that good times will last, they increasingly neglect downside risk and extend credit to less creditworthy borrowers. This lending is often concentrated in a set of new instruments that have a positive, but brief, performance history (Gennaioli, Shleifer, and Vishny [2012]). Investors have no memories of losses on these instruments, making it easier to sustain the boom-time belief that “financial crises are things that happen to other people ... at other times; crises do not happen to us, here and now” (Reinhart and Rogoff [2009]). Eventually, however, defaults escalate and a credit crisis arrives when investors are predictably surprised by the realization of risks they were previously neglecting.¹

In this paper, we reexamine the recent financial crisis in the context of this familiar narrative of credit cycles. Several new forms of securitization—many linked to subprime mortgages—were at the heart of the financial crisis, with issuance growing exponentially from 2003 to early 2007 before collapsing in mid-2007. Despite the severity of the ensuing crisis, there is still little consensus about the forces that fueled the rise in investor demand for these new securitization products tied to subprime mortgages.

There is anecdotal evidence that Goldilocks thinking may have played a critical role in driving investor demand for securitizations. Writing in 2005, Robert Shiller noted “the popular notion that real estate prices always go up is very strong.” Similarly, Gerardi, Lehnert, Sherlund, and Willen (2008) show that during the credit boom most Wall Street analysts believed that a sizable drop in nationwide home prices was nearly impossible, even though prices had risen by nearly 75% over the previous decade. Such Goldilocks thinking about house prices could have

¹ The relationship between credit cycles and investor over-extrapolation is studied in recent work, including Gennaioli, Shleifer, and Vishny (2012, 2015), Greenwood and Hanson (2013), and Baron and Xiong (2015).

influenced investor demand for securitizations tied to subprime mortgages. In this paper, we provide more formal evidence in support of this hypothesis.

The key to our analysis is to translate the predictions of the Goldilocks narrative, which is essentially a time-series story, into the cross section of credit investors. Drawing on the growing literature on belief formation, we argue that firsthand experiences are an important determinant of how susceptible different investors are to Goldilocks thinking.² The central ideas in the belief-formation literature—that firsthand experiences, especially recent or extreme experiences, have a large impact on beliefs—provide the basis for our main predictions. Our analysis focuses on private-label mortgage-backed securities (MBS) backed by nonprime home mortgages and collateralized debt obligations (CDOs). As Figure 1 Panel A shows, the surge in securitization issuance during the 2003 to 2007 boom was concentrated in these relatively new instruments, which we refer to as “nontraditional” securitizations.

We examine these predictions using new micro-data on mutual fund’s holdings of securitizations from 2003 to 2010. Mutual funds are an ideal laboratory for exploring the role of firsthand experience on boom-time investment decisions because we can accurately measure the tenure of individual managers as well as their past investment experiences. While mutual funds are thus unique from a measurement standpoint, it nonetheless seems natural to generalize any findings about the role of fund managers’ firsthand experience to managers other types of financial intermediaries, including banks, pensions, insurers, and hedge funds.

Looking across bond mutual funds, we first show that inexperienced fund managers held far more nontraditional securitizations (NTS) in 2007 than more seasoned managers.³ Consistent with the idea that inexperienced managers were more susceptible to Goldilocks thinking, at the height of the boom they invested roughly 8.5% of their portfolios in NTS compared to just 4.5% for more seasoned managers. Put differently, by 2007 inexperienced managers had almost twice the NTS exposure of seasoned managers. Moreover, inexperienced managers bought riskier NTS than seasoned managers, purchasing higher-yielding, lower-rated tranches. The difference

² As we discuss further below, several papers, including Malmendier and Nagel (2011, 2014), provide empirical support for the idea that first-hand experiences have a large impact on beliefs and subsequent economic behavior.

³ Consistent with our story, Greenwood and Nagel (2009) show that inexperienced equity fund managers bought more tech stocks during the late 1990s stock market boom.

between inexperienced and seasoned managers widened over the course of the subprime boom. Both inexperienced and seasoned managers held roughly 3% of their portfolios in NTS in 2003. Inexperienced managers then bought significantly more NTS between 2003 and 2007.

What explains the different behavior of inexperienced and seasoned fund managers? Our data suggest that personal experiences with house price appreciation played a role. Inexperienced managers in areas where local house price appreciation was high bought more NTS than both seasoned managers and inexperienced managers in areas where house price appreciation was low. This suggests that firsthand experiences with local house prices shaped beliefs about national house prices and thus the attractiveness of NTS backed by subprime mortgages.

We then ask whether all experience as a fund manager is the same and show that it is not. Instead, the accumulation of experience seems to be path-dependent: manager's perceptions appear to be shaped by past personal experiences and performance outcomes. In particular, we find that managers who happened to avoid severe negative performance in the past bought more NTS, as did managers whose worst personal performance was further in the past. Thus, managers who had not been burned severely or in the recent past were more likely to buy into Goldilocks thinking during the boom.

We next link these cross-sectional results back to the time-series view that market tranquility breeds optimistic thinking. Given that the accumulation of experience is path-dependent, periods of broad credit market turmoil are likely to be times when many managers simultaneously gain important experience. Consistent with this, we find a discrete shift between managers who were active during 1998—when Russia's default and the failure of Long-term Capital Management led to a spike in credit spreads and sudden credit market turmoil—and those who did not. Bond managers who were active in 1998 held significantly less NTS than those who were not. Again, it is personal experience that matters. Among managers who were active in 1998, we find that those who personally suffered adverse investment outcomes in 1998 invested significantly less in NTS in 2007. Though 1998 and 2007 were relatively close in time, high turnover among fund managers amplifies the collective effects of recent experience. In our data, only 31% of managers active in 2007 had the experience of managing through 1998, suggesting that the process of “collectively forgetting” past crises happens swiftly.

We also consider possible substitutes for firsthand experience. Specifically, we consider the roles of “institutional memory” within fund families and manager training. We find that the

performance of a fund's family in 1998 has an effect on its 2007 NTS holdings that is independent of the fund manager's 1998 performance. Specifically, inexperienced managers running funds in families that experienced low returns or high withdrawals in 1998 had lower NTS exposure in 2007. This is consistent with the idea that institutions have memory that can differ from those of an individual employee. We also find that fund managers with more training—those who had earned the Chartered Financial Analyst designation—held less NTS in 2007, and that the effect of training is stronger for inexperienced managers.

Finally, we explore the behavior of inexperienced managers during the financial crisis. We find that inexperienced managers sold more NTS during the crisis than seasoned managers. These sales do not appear to be forced by outflows—even controlling for the greater outflows that their funds suffered, inexperienced managers sold more NTS. In addition, the securitized bonds held by inexperienced managers were written down more substantially than those held by seasoned managers, suggesting that inexperienced managers held NTS that were riskier *ex post*. These results are consistent with the idea that optimistic beliefs drove the NTS holdings of inexperienced manager. Their greater optimism made risky NTS attractive, and once their belief that NTS were safe was challenged they aggressively sold their holdings.

We also consider and rule out several alternative explanations for our findings. For example, it could be the case more risk-loving investors seek out inexperienced managers, who rationally bought NTS on behalf of these investors. However, our results are all robust including fund objective-quarter fixed effects, so they are not driven by a tendency for inexperienced managers to run funds with riskier objectives. Moreover, this alternative cannot explain our results about the effects of firsthand experience within the set of inexperienced or seasoned managers. Inexperienced mutual fund managers could have also faced incentives that were more misaligned with those of their shareholders than seasoned managers and consequently taken greater risk. However, we find little evidence of this in our data: inexperienced and seasoned managers faced similar performance-flow relationships, a common proxy for the strength of the risk-taking incentives faced by managers. Another alternative explanation for our results is that more conservative managers survive longer and are thus more experienced on average. Again, while this kind of differential survival might explain our basic finding that inexperienced managers owned more NTS in 2007, it cannot explain our results about the effects of firsthand experience within the set of inexperienced or seasoned managers. Overall, our results are most

consistent with the idea that Goldilocks thinking brought on by a period of market tranquility played an important role in driving investor demand for NTS.

The plan for the paper is as follows. Section II provides background on securitizations and develops our main cross-sectional hypotheses about the factors that increase investors' susceptibility to boom-time thinking. Section III explains the data sources we use, and Section IV presents our main findings. Section V offers some concluding remarks.

II. Background on Securitization and Hypothesis Development

A. Background on securitization

Securitizations are created by assembling a pool of financial assets such as loans or debt securities and then tranching the cash flows from these assets into claims of various priorities. In the United States, securitization dates to the late 1960s and early 1970s when various Government Sponsored Enterprises (GSEs), corporations that were implicitly or explicitly guaranteed by the U.S. government, began securitizing home mortgages. Only “conforming” mortgages, which meet certain requirements for loan size, borrower credit scores, loan-to-value ratios, and loan documentation, are eligible to be included in GSE mortgage securitizations. The GSEs guarantee the payment of principal and interest on the underlying loans, so investors in *GSE-guaranteed mortgage-backed securities (GSE MBS)* bear little credit risk.

The late 1970s and 1980s saw the advent of several types of private securitizations that were not guaranteed by the U.S. government, thus exposing investors to credit risk. We refer to these as “traditional securitizations” and they include:

- *Commercial Mortgage Backed Securities (CMBS)*: Securitizations backed by commercial mortgage loans.
- *Consumer Asset-Backed Securities (Consumer ABS)*: Securitizations collateralized by non-mortgage consumer debt, including credit card, automotive, and student loans.
- *Prime Residential Mortgage-Backed Securities (Prime RMBS)*: Securitizations of prime “jumbo” mortgages that conformed to all GSE criteria other than the size limit.

The boom in private securitization from 2003 to 2007 prominently featured two new types of private securitizations, which developed much later than these traditional securitizations. We label this second generation of private securitizations as “nontraditional.” They include:

- *Nonprime Residential Mortgage-Backed Securities (Nonprime RMBS)*: Securitizations of subprime and Alt-A home mortgages, which do not conform to the GSEs standards due to high loan-to-value ratios, insufficient documentation, or low borrower credit scores.⁴
- *Collateralized Debt Obligations (CDOs)*: CDOs are securitizations backed by a portfolio of fixed income assets, which can include corporate bonds, loans, or other securitizations. During the boom, a large fraction of CDOs were collateralized by nonprime RMBS.⁵

As shown in Figure 1 Panel A, the boom in securitization between 2003 and 2007 was concentrated in NTS. Quarterly issuance of traditional securitizations roughly doubled from \$103 billion in 2002Q4 to \$200 billion at its peak in 2007Q2. However, quarterly issuance of NTS more than quadrupled from \$98 billion in 2002Q4 to \$420 billion at the peak in 2006Q4. The pattern shown in Figure 1 is consistent with the broader theme that the emergence of new types of instruments and borrowers often plays a prominent role in credit booms.

Consistent with a large outward shift in investor demand for NTS, there was little adjustment in the credit spreads on NTS during this surge in issuance. Panel B of Figure 1 plots the time series of new-issue spreads for traditional and nontraditional securitizations from 2003Q1 to 2007Q4 and shows that spreads on AAA-rated NTS fell during the boom.

Figure 1 Panel B also shows that spreads on AAA-rated NTS were noticeably wider than those on other AAA-rated assets at the beginning of the boom. Indeed, spreads on AAA-rated NTS were closer to those on BBB-rated corporate bonds than those on AAA-rated corporate bonds in 2004 and 2005. The spreads on NTS are consistent with the differences in behavior between inexperienced and seasoned investors we document below. If inexperienced and seasoned managers disagreed about the downside risk of NTS during the boom, the wider spreads on NTS relative to comparably-rated assets would have led the most optimistic investors (inexperienced managers) to overweight NTS relative to less optimistic investors (seasoned

⁴ See Fabozzi (2005), Gorton (2008), and Ashcraft and Schuermann (2008) for background on nonprime RMBS.

⁵ CDOs are classified as collateralized bond obligations (CBOs), collateralized loan obligations (CLOs), or ABS CDOs. CBOs are collateralized by corporate bonds and were the most common type of CDO until the early 2000s. CLOs invest in senior secured loans to highly leveraged firms. ABS CDOs were backed by bonds from other securitizations, mainly nonprime RMBS. ABS CDO issuance exploded during the boom and accounted for many of the largest losses incurred by financial intermediaries in 2007 and 2008. See Barnett-Hart (2009), Cordell, Huang, and Williams (2012), and Shivdasani and Wang (2013) for further details on CDOs.

managers).⁶ The figure shows that the spreads on nontraditional securitizations converge towards the spreads on traditional securitizations at the height of the boom in 2006 and 2007, consistent with the idea that optimistic thinking was spreading among investors during the boom, increasing the demand for NTS.

B. Hypothesis development

What drove the increase in demand for nontraditional securitizations? In this section, we discuss the existing literature on the role of beliefs in fueling the credit booms that culminate in financial crises. We then flesh out the cross-sectional implications of the view that these boom-time beliefs arise in part from the personal experiences of market participants.

Many authors, including Kindleberger (1978), Minsky (1986), Shiller (2005), Reinhart and Rogoff (2009), and Geithner (2014), point to overly optimistic beliefs as the key culprit that fuels credit booms. In the case of credit booms (as opposed to stock market bubbles), over-optimism takes the form of neglected downside risks: investors believe that adverse outcomes are highly unlikely, making risky credit assets attractive investments (Genniaoli, Shleifer, and Vishny [2012, 2015], Greenwood and Hanson [2013]).

How do such overly optimistic beliefs arise? And are all investors equally susceptible to this form of boom-time thinking? A growing literature in economics, both theoretical and empirical, suggests that individuals' firsthand experiences play a crucial role in belief formation. On the empirical side, several papers have documented that prior experience influences individuals' beliefs about inflation, asset prices, and the broader financial system.⁷ In addition, there is a growing literature showing that prior firsthand experiences affect the behavior of households, institutional investors, and corporate managers, presumably by altering their beliefs.⁸

⁶ Formally, suppose that inexperienced investors expected NTS to have the same loss rates as comparably-rated traditional securitizations (TS), but that seasoned investors expected NTS to have higher default rates. Then, in equilibrium, one would expect (i) spreads on NTS to be higher than those on comparably-rated TS; (ii) inexperienced investors to be overweight NTS; and (iii) seasoned investors to be underweight NTS.

⁷ Vissing-Jorgensen (2003) shows that young retail investors had the highest stock return expectations during the late 1990s. Guiso, Sapienza, and Zingales (2004) show that experience affects trust in the financial system. Amromin and Sharpe (2009) analyze microdata on stock market expectations and find that individuals expect higher returns in booms. Malmendier and Nagel (2014) show that experienced inflation affects future expectations of inflation.

⁸ Piazzesi and Schneider (2012) show that survey expectations of inflation are related to household borrowing and lending decisions. Malmendier and Nagel (2010) show that individuals who have experienced poor stock returns in their lifetime take significantly less stock market risk than those who have experienced stronger lifetime returns.

Much of the theoretical literature on belief-formation has been motivated by work in psychology, particularly Kahnemahn and Tversky (1972, 1974), which highlights two crucial deviations from Bayesian belief formation: the representativeness heuristic and the availability heuristic. The representativeness heuristic refers to people’s tendency to assess the probability of a hypothesis by assessing the extent to which the data at hand are prototypical of that hypothesis. This heuristic leads subjects to neglect prior probabilities and to be insensitive to sample sizes: people seem to believe in a “law of small numbers, which asserts that the law of large applies to small numbers” (Tversky and Kahneman [1971]). As a result, people overestimate the extent to which their firsthand experiences (a small sample) are informative about the population of potential experiences. The availability heuristic refers to people’s tendency to estimate probabilities by the ease with which instances of some event come to mind. Certain experiences are more salient and come to mind more readily. In particular, recent experiences and extreme firsthand experiences are more accessible, leading people to overestimate the likelihood that extreme or recent experiences will recur.⁹ In addition to these heuristics, a large literature in psychology, including Nisbett and Ross (1980), Weber et al (1993), and Hertwig et al (2004), also argues that personal experiences exert a strong direct influence on decision-making.¹⁰

In our setting, the idea that firsthand experience matters suggests that NTS should have been particularly attractive to inexperienced investors, who only participated in credit markets in the years immediately preceding the financial crisis. These investors would have taken the tranquility of those years as representative of the set of possible outcomes, leading them to neglect the risk of serious credit market disruptions relative to more seasoned investors. Moreover, inexperienced managers would have found riskier NTS more attractive.

Similarly, Malmendier and Tate (2005) and Malmendier, Tate, and Yan (2011) find that CEOs who grew up in the Great Depression are more conservative. Kaustia and Knupfer (2008) and Chiang, Hirshleifer, Qian, and Sherman (2011) show that prior return experience affects investor participation in initial public offerings. Campbell, Ramadorai, and Ranish (2014) show that retail investors become more sophisticated as they trade more.

⁹ For formal models of belief formation inspired by the representativeness and availability heuristics, see Barberis, Shleifer, and Vishny (1998), Rabin (2002), Fuster, Laibson, and Mendel (2010), Fuster, Hebert, and Laibson (2011), Gennaioli and Shleifer (2010), Bordalo, Gennaioli, and Shleifer (2014).

¹⁰ The literature on reinforcement learning argues peoples’ chosen actions depend on the payoffs they have personally obtained from taking various actions in the past (Erev and Roth [1998], Camerer and Ho [1999]).

Hypothesis 1: Inexperienced bond fund managers buy more nontraditional securitizations than seasoned managers. Within nontraditional securitizations, inexperienced managers buy riskier NTS.

The availability heuristic also suggests that personal experiences should have affected investor beliefs about the path of house prices and the attractiveness of NTS, which were largely backed by housing collateral. While all managers experienced the nationwide surge home prices, the availability heuristic suggests that investors who were exposed to high local house price appreciation should have been most optimistic about NTS. This should be especially true for inexperienced investors, who had not seen other house price appreciation regimes.

Hypothesis 2: Bond fund managers, particularly inexperienced managers, in areas with high local house price appreciation should buy more nontraditional securitizations.

We next flip the question around and ask what might make seasoned investors less susceptible to optimistic beliefs. The availability heuristic suggests that not all firsthand experiences receive the same weight. In other words, an investor with a long tenure is not necessarily an experienced investor: what happened during the investor's tenure matters. Extreme experiences and recent experiences are likely to have a larger impact on investor beliefs. In our context, this suggests that investors who happened to avoid extreme negative shocks or recent poor performance would be less likely to recognize the possibility of adverse outcomes. These investors would have been more willing to buy NTS.

Hypothesis 3: Bond managers who happened to avoid severe negative performance in their careers or who have performed well recently should buy more nontraditional securitizations.

How do these cross-sectional predictions about personal experience map into the time-series idea that credit booms are driven by a collective forgetting of adverse outcomes? It seems natural that broad market movements are salient experiences for many managers and thus affect their beliefs simultaneously. Therefore, periods of credit market turmoil are likely to be particularly important for determining market-wide attitudes. Thus, the further in the past the last episode of market turmoil, the more optimistic the average manager is likely to be.

The last severe credit market disruption prior to the securitization boom took place in 1998. The Russian default in 1998, combined with uncertainty surrounding the collapse of Long-term Capital Management, caused credit spreads to rise sharply. Thus, the experience gained from having been in the market in 1998 should have been a particularly influential.

Hypothesis 4: Being active in the credit market in 1998 should reduce bond fund manager holdings of nontraditional securitizations.

Of course, even within the group of investors who managed through 1998, representativeness and availability suggest that firsthand experiences should have an even greater effect than broad market experiences. Thus, a sharper prediction of the narrative is that investors who had good experiences in 1998 should have been particularly willing to buy NTS later on.

Hypothesis 5: Within the set of bond fund managers who were active in 1998, those who experienced particularly good performance should buy more securitizations.

Finally, we turn to substitutes for firsthand experience. We study two avenues for transmitting personal experience across individual managers: “institutional memory” within fund complexes and formal investment training. Fund managers do not choose their portfolios within a vacuum. They are part of the broader institutional structure of a fund family. Since fund families share research and operation resources, they may be avenues through which experiences can be shared more effectively. This kind of institutional memory may have effects over and above the manager’s individual experiences. Memories of past experiences could be transmitted informally within a fund family. For example, cautionary tales from prior boom-bust cycles may be passed down from senior managers to their junior counterparts and may serve as a partial substitute for firsthand investment experiences. Alternatively, in response to past failures, financial institutions may establish formal investment policies and procedures designed to prevent the erosion in investment standards during booms. In our context, this suggests that inexperienced managers working in fund families that did well in 1998 should have bought more securitizations. These managers had neither the personal experience nor the institutional memory to make the possibility of adverse outcomes salient or available.

Like institutional memory, formal investment training—e.g., completing the Certified Financial Analyst program—may also serve as a partial substitute for personal experience. Investors who have studied the mistakes of the past may not be doomed to repeat them. Formal training is again likely to be particularly important for inexperienced investors, who lack personal experience that would make the possibility of severe negative outcomes more salient.¹¹

¹¹ Several studies have asked whether there is a relationship between manager education and fund performance. Shukla and Singh (1994) and Switzer and Huang (2007) find that CFAs outperform and Golec (1996) argues that

Hypothesis 6: Inexperienced bond fund managers in fund families that did well in 1998 should buy more securitizations. Conversely, inexperienced bond fund managers with more formal investment training should buy fewer securitizations.

III. Data

We combine new data on mutual funds' holdings of securitizations with several standard mutual fund data sets.

A. Mutual fund holdings

Our holdings data is from Thomson Reuters eMAXX and contains quarterly CUSIP-level holdings of securitizations by U.S.-domiciled mutual funds. Thomson Reuters obtains par value holdings data from funds' regulatory filings, Forms N-CSR(S) and N-Q, as well as directly from funds. Our sample period runs from 2003Q1 to 2010Q4 from the start of the securitization boom through the bust. Our sample of fund-quarter observations from eMAXX conditions on having at least one securitization in their portfolio, including GSE MBS, at some quarter end between 2003Q1 to 2010Q4. Thus, the funds missing from our eMAXX sample are those that by regulation, charter, or choice never hold securitizations of any sort.

B. Securities

We supplement our holdings data by collecting detailed security-level data from the three major credit rating agencies—Fitch, Moody's, and S&P—and Bloomberg. Combining these data sources, we classify securitizations into the six broad collateral types discussed in Section II: GSE MBS, CMBS, consumer ABS, prime RMBS, nonprime RMBS, and CDOs. Our focus is on explaining funds' demand for the nontraditional securitizations that were at the heart of the credit boom and bust. Therefore our main dependent variable is the *nontraditional share*:

$$NTS\ share = NTS\ par\ holdings \div Fixed-income\ par\ holdings, \quad (1)$$

the share of nonprime RMBS and CDOs in a fund's overall fixed-income portfolio. We also collect data on each security's spread at issuance from Moody's and Bloomberg, the initial rating assigned by Moody's, and the time series of outstanding par amount from Bloomberg.

MBA's outperform. However, Boyson (2002) finds that CFAs and MBAs underperform. Chevalier and Ellison (1999) find that managers who attended more selective colleges outperform. Dincer, Gregory-Allen, and Shawky (2010) find that more experienced managers and CFAs take less risk, while MBAs take greater risk.

C. Mutual fund and fund portfolio manager characteristics

We obtain mutual fund investment objectives, net assets, returns, and flows from the CRSP Mutual Fund Database. We restrict attention to domestic taxable bond funds and hybrid stock/bond funds using Lipper objective codes. We exclude money market funds, index bond funds, and Treasury-only government bonds funds. Thus, our sample of bond funds consists primarily of balanced hybrid funds, investment grade bond funds, high yield bond funds, and government bond funds that can buy securities other than Treasuries.

We obtain biographic data on fund portfolio managers from Morningstar, including their start and end dates managing different mutual funds. We measure each manager's experience as the number of years since the first time we observe them managing a fund in Morningstar. We also have data on whether each manager is a Chartered Financial Analyst. For team-managed funds, the fund characteristics are averages of individual portfolio manager characteristics.

We follow Greenwood and Nagel (2009) and hold fixed the measure of each fund's experience at its pre-boom level. Specifically, our experience variable is based on the fund's team of managers as of December 31, 2004. We then label management teams as inexperienced if they were below the 2004 median level of experience across funds. This introduces some measurement error into our key explanatory variable, which may bias us against finding an effect of manager experience. However, fixing the definition of experience guards against the possibility that funds that wished to invest in securitizations endogenously chose younger managers during the boom. However, as we show below, we obtain nearly identical results if we update the measure of experience over time in response to manager turnover.

D. Summary statistics and aggregate holdings

In most of our cross-sectional analyses we collapse our data to fund-year observations by averaging the quarterly observations within each fund-year. Table I provides summary statistics for our 2003 to 2010 annual panel of mutual funds. We have 5,983 fund-year observations, representing 987 unique funds. The median fund has net assets of \$300 million and total par fixed-income holdings of \$227 million. The median fund in our data is managed by two portfolio managers who average roughly eight years of experience. The median fund invested roughly 1% of its fixed-income portfolio in nontraditional securitizations. However, the distribution of nontraditional share is highly right-skewed with an average of roughly 4.6%.

As of 2007Q4, the funds in our sample held \$52 billion of NTS in aggregate, \$906 billion of fixed-income assets, and \$1,332 billion of total assets. Thus, the value-weighted NTS share was 5.7%. By way of comparison, NTS represented roughly 10% of the long-term bond market at the end of 2007.¹² Thus, relative to the market portfolio, mutual funds as a whole were modestly underweight NTS with a 5.7% weight versus a 10% weight. However, the funds in our sample exhibit considerable heterogeneity in their exposure to NTS. For example, 20% of the mutual funds in our sample had a NTS share above 10% in 2007.

IV. Results

A. *The impact of investor experience on 2007 NTS holdings*

Figure 2 tests Hypothesis 1 and illustrates our main finding: inexperienced fund managers held significantly more NTS than seasoned managers at the height of the securitization boom in 2007. The figure shows the fraction of managers with experience in each 4-year bucket—i.e., 0 to 4 years, 4 to 8 years, and so on—alongside the average NTS share for managers in each bucket. Figure 2 shows that the 2007 *NTS share* was strongly declining in manager experience. Furthermore, the relationship between *NTS share* and *Experience* was almost perfectly monotonic. Managers with less than eight years of experience had an *NTS share* of roughly 8%, those with between eight and 20 years of experience had an *NTS share* of roughly 4.5%, and those with more than 20 years of experience had minimal NTS exposure.

Table II formalizes this result in a regression setting. Specifically, Table II reports the results of cross-sectional regressions of funds' 2007 nontraditional securitization holdings on portfolio manager experience and various fund characteristics:

$$y_i = \alpha_{objective(i)} + \beta \cdot Inexperienced_i + \gamma' \mathbf{x}_i + \varepsilon_i. \quad (2)$$

Consider the regression in column (1) of Panel A. The dependent variable is the nontraditional share in percentage points ($y_i = NTS\ share_i$). Our measure of inexperience is dummy indicator for

¹² Based on the Flow of Funds, the rough size of the long-term U.S. bond market as of 2007Q4 was \$23.8 trillion, consisting of \$5.1 trillion in Treasuries, \$7.4 trillion in GSE debt and GSE-MBS, and \$11.3 trillion in corporate bonds and private securitizations. Of this total, there were roughly \$2.4 trillion of outstanding subprime RMBS and CDOs (netting out CDO holdings of subprime RMBS).

managers with below median experience as of 2004. The estimate of $\beta = 3.9$ ($t = 4.8$) says that the *NTS share* of inexperienced managers exceeded that of seasoned managers by roughly four percentage points in 2007. Economically, this is a sizable effect relative to the average *NTS share* of 4.6% shown in Table I and its standard deviation of 9.0%.¹³

In column (2) we include controls for other fund characteristics that might help explain NTS holdings: the fraction of managers that are Chartered Financial Analysts (*CFA*), an indicator for team-managed funds (*Team*), $\log(\text{Fund TNA})$, $\log(\text{Family TNA})$, $\log(\text{Fund age})$, $\log(\text{Family age})$, and the fraction of the fund family's assets under management that are in taxable bond funds (*Family taxable bond share*). The addition of these controls has almost no effect on estimated effect of experience: the coefficient on the inexperience dummy in column (2) is $\beta = 3.6$ ($t = 4.6$). Nonetheless, the estimated coefficients on the controls are of independent interest. All else equal, we find that funds where all managers were CFAs held 2.8% less NTS than funds with no CFA managers. We discuss this finding in greater detail below. Next we find that funds that were managed by multiple portfolio managers had larger NTS holdings. This likely reflects the fact that NTS are complex instruments (Coval, Jurek, and Stafford [2009], Arora, Barak, Brunnermeier, and Ge [2009], Hanson and Sunderam [2013]) and therefore required a larger management team. To further control for scale economies in investment management, we add the total net assets of both the fund and its fund family as controls. These size controls have little effect on the level of NTS holdings, although we show below that they have a larger effect on the extensive margin. We also add fund and family age as proxies for reputational capital, but these controls are not significant. The final control is the fraction of a family's assets in taxable bond funds. This control is both statistically and economically significant: a fund whose family was all fixed-income funds had an *NTS share* that was 7.5 percentage points higher than a fund whose family was all equity funds. This is consistent with the idea that some fund families have greater fixed-income expertise.

The next two columns show that we obtain nearly identical results if we add fixed effects for different Lipper investment objectives. Of course, there are systematic differences in NTS

¹³ In untabulated results, we find that it is experience and not age that matters. Although younger managers tend to have higher nontraditional shares around the peak of the credit boom, the difference is smaller (about 1%).

holdings by fund objective, so adding objective effects boosts the overall R-squared because. For example, mortgage-related funds held 15.3% of NTS on average, compared to 10.1% for broad investment grade funds, 3.8% for high yield funds, 3.5% for investment grade corporate funds, 3.1% for U.S. government funds, and 4.5% for hybrid stock/bond funds.¹⁴ Nonetheless, adding objective fixed effects has little effect on our estimates of β because there is almost no variation in average manager experience across investment objectives. Finally, when we include both objective fixed effects and controls in column (4), we obtain $\beta = 3.4$ ($t = 4.7$).

Columns (5) to (8) of Panel A show analogous linear probability specifications where the dependent variable is an indicator equal to one if the fund holds any NTS ($y_i = Has\ NTS_i$). The estimates show that inexperienced managers were 10 percentage points more likely to hold any NTS than seasoned managers. The unconditional probability that a manager in our sample held any NTS is roughly 64%, so this is an economically significant effect. Thus, manager experience had a powerful impact on both the extensive and intensive margins of NTS holdings.

Panel B repeats the same eight specifications using a continuous measure of manager inexperience: $-1 \times$ years of experience. Again, we see that experience has a strong effect on both the intensive and extensive margins of NTS holdings. For instance, the estimate of $\beta = 0.26$ ($t = 3.7$) in column (4) of Panel B implies that a highly-seasoned bond manager with 20 years of experience had an *NTS share* that was 5.1 percentage points less than a rookie manager.

Table III reports a battery of robustness exercises for our main finding that inexperienced managers held more NTS in 2007 at the height of the mortgage boom. For each robustness exercise, we show results measuring inexperience using an indicator for below-median experience and using a continuous measure of experience in years. We also show results using our continuous holdings measure as well as an indicator for funds holding any NTS. All specifications include the full suite of controls from Table II as well as fund objective fixed effects. Row (1) repeats our baseline results from columns (4) and (8) of Table II.

One natural concern is that the results in Table II may be driven by very small bond funds. Indeed, the 250 largest funds account for nearly 90% of the total bond holdings in the

¹⁴ It is interesting that some “U.S. government funds” held meaningful amounts of NTS. Of course, “Treasury-only” funds are prohibited from holding NTS and are excluded from our sample. However, government funds can and do hold limited amounts of non-government-related securities, including private securitizations and corporate bonds.

sample. However, as shown in row (2), we obtain even stronger results if, instead of estimating equal-weighted regressions, we instead estimate regressions that weight each fund by its total net assets. Similarly, row (3) shows that we obtain similar results focusing on the 250 largest funds.

We next modify the dependent variable in our baseline specification. Row (4) shows that we obtain nearly identical results if we use holdings of nontraditional securitizations scaled by total net assets ($y_i = NTS \text{ par holdings}_i / TNA_i$). Rows (5) and (6) decompose each fund's holdings of nontraditional securitizations into its AAA holdings and its non-AAA holdings based on initial Moody's ratings. Thus, when the dependent variable is measured continuously, the sum of the coefficients in rows (5) and (6) equals the coefficient in row (1). Specifically, Table III shows that the 3.4 ($t = 4.7$) percentage point greater *NTS share* for managers with below-median experience can be decomposed into 2.5 percentage points ($t = 4.0$) of additional AAA-rated NTS and 0.9 ($t = 3.4$) of non-AAA-rated NTS. Thus, roughly 75% of the effect shown in Table II is explained by the greater AAA-rated NTS holdings of inexperienced managers. This is to be expected given that AAA-rated tranches comprised between 75% and 85% of NTS tranches depending on the specific underlying collateral. Similarly, rows (7) and (8) decompose NTS holdings into nonprime RMBS and CDO holdings: we see that inexperienced investors held both more nonprime RMBS and more CDOs than seasoned managers.

Perhaps inexperienced managers were more likely to hold all types of securitizations and not just nontraditional securitizations. This is not the case as shown in rows (9) and (10) where the dependent variable is the portfolio share of traditional securitizations and GSE MBS. Specifically, row (9) shows that inexperienced manager had a very similar portfolio weight in traditional securitizations to seasoned managers. (However, inexperienced managers were somewhat more likely to hold positive amounts of traditional securitizations). And, if anything, row (10) shows that inexperienced managers held slightly less GSE MBS.

Finally, we modify the independent variable. Specifically, row (11) shows that we obtain broadly similar results if we measure experience as of 2007 as opposed to 2004.

B. Spreads on NTS holdings

The second part of Hypothesis 1 posited that the greater optimism of inexperienced managers should have led them to buy riskier NTS than other managers. Table IV shows that inexperienced managers held NTS that were issued at wider spreads than seasoned managers. To

avoid benchmarking issues, we restrict attention to the spreads on floating rate NTS indexed to LIBOR and compute the par-weighted spread at issue on all NTS held by each fund as of 2007. We can compute this spread measure for 350 funds out of the 508 who held NTS as of 2007.

Panel A shows the result for the average raw NTS spread at issue. As shown in column (1), seasoned managers held NTS with an average spread of 39 bps and inexperienced managers held NTS that offered 17 bps ($t = 2.7$) of additional spread. Panels B shows that adjusting NTS spreads for vintage (quarter-of-issue) does not change the coefficient on inexperience. However, the difference in spreads vanishes in Panel C once we adjust for both vintage and initial rating, suggesting that inexperienced managers bought NTS with slightly lower initial ratings.

C. Investor experience and the evolution of NTS holdings from 2003 to 2010

When did the difference in NTS holdings between seasoned versus inexperienced managers develop? One possibility is that inexperienced managers were always more optimistic about NTS. Alternatively, they may have become more bullish as the mortgage boom grew.

Figure 3 plots the average NTS holdings by seasoned and inexperienced managers each quarter from 2003Q1 to 2010Q4. Funds with inexperienced managers are those with below-median experience as of 2004Q4 and, as above, this classification does not vary over time for a given fund. The figure shows that inexperienced managers became more bullish on NTS relative to seasoned managers over the course of the boom. Both seasoned and inexperienced managers started with a 3% portfolio weight in nontraditional securitizations in 2003. Beginning in 2004, all managers increased their nontraditional share as subprime-related issuance boomed, but inexperienced managers increased their nontraditional securitization holdings by far more. By 2007Q2, just before the collapse of the market for nontraditional securitizations, inexperienced managers had an *NTS share* of 8.5% compared to 4.5% for seasoned managers.

Table V shows this result more formally using cross-sectional regressions. For each year from 2003 to 2010, we estimate a separate cross-sectional regression of *NTS share* on our dummy indicator for inexperienced managers. The regressions include investment objective fixed effects and the same set of controls as in Table II. (Thus, the estimates for 2007 correspond to those in column (4) of Table II Panel A.) Table V shows that in 2003, all else equal, inexperienced managers had a *NTS share* that was only 0.3 ($t = 0.8$) percentage points higher than seasoned managers. The difference between inexperienced and seasoned managers rises

gradually between 2004 and 2007, peaking at 3.4 ($t = 4.7$) percentage points in 2007.

D. Does investor experience shape reactions to house price appreciation?

What explains the timing documented in Table V? Why did the NTS holdings of inexperienced managers begin to diverge from the holdings of seasoned managers in 2003? Hypothesis 2 highlights the role of local home price appreciation (HPA). Since the vast majority of NTS were backed by housing collateral, manager beliefs about future house price appreciation were likely a key determinant of their attitudes towards NTS. The availability heuristic suggests that local home price appreciation may have exerted a stronger effect on the beliefs of inexperienced managers than seasoned managers.

Table VI offers evidence that is supportive of this idea, reporting regressions of the form:

$$NTS\ share_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot High\ local\ HPA_i + \beta_3 \cdot Inexperienced_i \times High\ local\ HPA_i + \gamma' \mathbf{x}_i + \varepsilon_i. \quad (3)$$

High local HPA is a dummy indicator for funds that are headquartered in MSAs that experienced home price appreciation in the top tercile from 2003 to 2006.¹⁵ Thus, equation (3) asks whether managers located in MSAs that witnessed high home price appreciation held more NTS in 2007 than others and whether the investment behavior of inexperienced managers was more sensitive to local HPA. The idea is that local home price appreciation may have shaped managers' beliefs about national home price trends and, hence, their beliefs about nontraditional securitizations.

Consider the estimates in columns (3) and (4) of Table VI which include our suite of controls and objective fixed effects. As before, column (3) shows that inexperienced managers purchased significantly more NTS in 2007 than others. In addition, the coefficient on local house price appreciation in column (3) is statistically and economically significant: managers based in a high HPA MSAs had an *NTS share* that was $\beta_2 = 2.3$ higher ($t = 2.1$) than those in a low HPA MSAs. Next, column (4) adds the interaction between our inexperienced manager indicator and the high HPA indicator. We find $\beta_3 = 3.2$ ($t = 1.9$), suggesting that inexperienced bond managers were more swayed by local housing market conditions than seasoned investors.

¹⁵ We obtain similar results using a continuous measure of local HPA.

E. The role of personal investment experiences

We next flip the question around and ask what makes seasoned investors less susceptible to boom-time thinking. Hypothesis 3 emphasizes the importance of personally avoiding severe negative performance. The availability heuristic suggests that managers who happened to avoid poor performance would underweight the likelihood of adverse outcomes and buy more NTS. In other words, seasoned managers who have happened to avoid poor performance are like inexperienced managers.

Table VII offers evidence that supports this idea, reporting regressions of the form:

$$\begin{aligned} NTS\ share_i = & \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot HighAvgReturn_i \\ & + \beta_3 \cdot HighMinReturn_i + \beta_4 \cdot DistantMinReturn_i + \gamma'x_i + \varepsilon_i. \end{aligned} \quad (4)$$

Equation (4) asks whether managers whose average returns or minimum returns are high held more NTS in 2007. Managers with high minimum returns are those who happened to have avoided poor performance over their careers up to 2007. Equation (4) also asks whether managers whose minimum return is further in the past held more NTS in 2007.

In equation (4), we compute each manager's minimum return from 1995 to 2005, and *HighMinReturn* is an indicator for managers with minimum returns in the top two terciles. We compute each manager's average return from 1995 to 2005, *HighAvgReturn* is an indicator for managers with average returns in the top two terciles. *DistantMinReturn* is a continuous measure of how far in the past the manager's minimum return was.

Column (6) of Table VII shows that high average returns have no effect on NTS holdings, while high minimum returns have a strong positive effect. Consistent with the idea that extreme experiences are more salient, managers who happened to avoid severe negative performance have NTS shares that are $\beta_3 = 2.2$ higher ($t = 2.1$). Similarly, consistent with the idea that recent experiences are more accessible and, thus, are over-weighted, managers whose own worst return is further in the past hold more NTS. A manager whose lowest return was in 1995 holds $\beta_4 = 5.7$ ($t = 2.8$) percentage points more NTS than a manager whose minimum return was in 2005.

F. Personal experiences during prior credit market disruptions

Our results up until now have highlighted how cross-sectional differences in manager experience affected attitudes towards NTS in 2007. Hypothesis 4 suggests how this mechanism

can translate into the time-series idea that credit booms are driven by a collective forgetting of past adverse outcomes. Periods of credit market turmoil may be particularly important in shaping market-wide attitudes because they are times when many managers simultaneously have salient personal experiences. Thus, the further in the past the last serious episode of turmoil, the more optimistic the average manager is likely to be.

Hypothesis 4 highlights the role of managing through the fall 1998 crisis—the most recent credit market disruption preceding the mortgage boom. In Table VIII, we find evidence consistent with this view. Looking at the cross-section of bond funds in 2007, Panel A reports specifications of the form:

$$NTS\ share_i = \alpha_{objective(i)} + \beta \cdot 1\{Manager\ starts\ after\ 1/1/YYYY\} + \gamma'x_i + \varepsilon_i. \quad (5)$$

for $YYYY = 1995$ to 2002 . Thus, each column defines the inexperienced dummy based on a different cutoff for the first year that the manager started to manage mutual funds. Figure 4 shows the same result graphically.

Looking at Table VIII and Figure 4, the effect of experience is highly nonlinear: the effect only kicks in when a manager has seven to eight years of experience. These are the managers who were active during the dislocations of 1998, which saw turbulent fluctuations in credit spreads following Russia's default, and perhaps learned about tail risk from that episode.

Why might 1998 experience exert a strong effect on manager behavior? Many observers argue that the 1998 crisis, like the onset of the subprime crisis in 2007Q3, was remarkable for its swift, unexpected transition from tranquil market conditions to severe turmoil. For instance, in the aftermath of the 1998 crisis, Alan Greenspan (1998) testified that “What is remarkable is not this episode, but the relative absence of such examples over the past five years.” Thus, because the 1998 event was different from the gradual, cyclical widening of credit spreads from 2000 to 2002, it may have more greatly influenced manager perceptions of genuine tail risk.

In Panel B, we examine Hypothesis 5, which emphasizes the personal experiences of managers who were active in 1998. We restrict attention to the subset of managers that managed a fund during 1998 and were still active in 2007. To explore whether the investment outcomes that managers experienced in 1998 affected their subsequent behavior, we estimate:

$$NTS\ share_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot High\ outcome_i^{1998} + \beta_3 \cdot Inexperienced_i \times High\ outcome_i^{1998} + \gamma'x_i + \varepsilon_i. \quad (6)$$

In equation (6), $Inexperienced_i$ is a dummy is equal to one for managers above the median of the distribution of experience within the sample of those who managed during a fund during 1998. For each manager, we measure the minimum returns and flows across all funds she managed during 1998. $High\ outcome_i^{1998}$ is then an indicator for funds whose 1998 outcome is outside the bottom tercile: these are the managers who happened to avoid the worst outcomes in 1998.

The regressions in Panel B show two interesting results. First, managers that experienced favorable investment outcomes in 1998—whether in terms of fund returns or flows—held significantly more *NTS* in 2007. By contrast, managers who experienced poor returns or heavy outflows in 1998 steered clear of *NTS* in 2007. Second, the effect of 1998 outcomes on subsequent behavior is stronger for managers who were relatively inexperienced in 1998.

Focusing on column (3) which includes our suite of controls as well as objective fixed effects, the coefficient on $High\ returns^{1998}$ says that, all else equal, managers who experienced high 1998 returns had a 2007 *NTS share* that were 2.6 percentage points higher ($t = 2.5$) than those with low 1998 returns. The specification in column (4) then interacts $High\ returns^{1998}$ with the *Inexperienced* indicator as in equation (5). The estimates suggest that a manager who was inexperienced, but who had poor returns in 1998 held no more *NTS* in 2007 than a seasoned manager with poor returns: $\beta_1 = -0.3$ ($t = 0.2$). Similarly, a seasoned manager with high returns in 1998 held no more *NTS* than a seasoned manager with low 1998 returns: $\beta_2 = 0.2$ ($t = 0.2$). However, inexperienced managers with high 1998 returns held a large amount of *NTS* in 2007: $\beta_3 = 4.8$ ($t = 2.7$). Thus, the behavior of managers who were inexperienced in 1998 was powerfully shaped by their personal experiences during that disruption. Said differently, inexperienced managers who were not burned in 1998 put their hands on the stove in 2007.

Columns (5) and (6) show the corresponding specifications where our measure of 1998 investment outcomes is now funds flows as opposed to returns. Like column (3), column (7) shows that managers who experienced large outflows in 1998 subsequently steered clear of *NTS*. However, for fund flows, we find little evidence of an interaction effect between inexperience and the 1998 outcome experienced by a manager.

The importance of crisis experiences in shaping manager perceptions of tail risk is particularly significant given the high turnover among investment managers. In our data, only 31% of managers active in 2007 had the experience of managing through 1998. Thus, our

findings suggest that the high turnover of managers may help accelerate the collective process of “forgetting” past crises and amplify the collective effects of recent experiences.

G. Substitutes for personal experience

We next turn to factors that may be partial substitutes for firsthand experiences. Since investor turnover is inevitable, factors that substitute for personal experience across individual managers are important. In this subsection, we consider two such factors: the role of institutional memory and the role of formal investment education and training.

G.1. Institutional versus personal memory

Hypothesis 6 suggests that inexperienced managers working in fund families that did well in 1998 should buy more securitizations. These managers had neither the personal experience nor the institutional memory to make the possibility of adverse outcomes salient.

Table IX examines this prediction. Using our 2007 cross-section of funds, we estimate:

$$\begin{aligned}
 NTS\ share_i = & \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot High\ manager\ outcome_i^{1998} \\
 & + \beta_3 \cdot Inexperienced_i \times High\ manager\ outcome_i^{1998} \\
 & + \delta_2 \cdot High\ family\ outcome_i^{1998} + \delta_3 \cdot Inexperienced_i \times High\ family\ outcome_i^{1998} \\
 & + \gamma'x_i + \varepsilon_i.
 \end{aligned} \tag{7}$$

In equation (7), *Inexperienced* and *High manager outcome*¹⁹⁹⁸ are defined as in equation (6) above. *High family outcome*¹⁹⁹⁸ is defined analogously at the family using the value-weighted average returns and flows for each family’s taxable bond funds in 1998.

Consider columns (3) and (4) of Table IX which include objective fixed effects and our suite of controls. Column (3) shows that managers who personally experienced high returns in 1998 have an *NTS share* that is $\beta_2 = 2.8$ ($t = 2.3$) percentage points higher than managers experiencing poor performance. And, consistent with the institutional memory hypothesis, funds whose families earned higher returns in 1998 have an *NTS share* that is $\delta_2 = 1.8$ ($t = 1.8$) percentage points higher than funds whose families suffer low returns. Column (4) interacts both the manager’s and the fund family’s investment outcomes with the indicator for inexperienced managers. We find $\beta_3 = 3.3$ ($t = 1.5$) and $\delta_3 = 7.0$ ($t = 3.3$), indicating that both past personal and past institutional experiences exert a stronger effect on the behavior of inexperienced managers.

G.2. Manager training

Another partial substitute for firsthand experience is formal investment education and

training. The Chartered Financial Analyst (CFA) credential is a highly-regarded qualification in the investment management industry, often thought of as the equivalent of a Master's Degree. CFA candidates must pass three six-hour examinations, covering micro- and macro-economics, statistics, fixed-income and equity securities, financial derivatives, portfolio theory, securities law and regulation, and financial accounting. Pass rates are generally below 50%. 48% of portfolio managers in our sample have earned a CFA, whereas only 23% had an MBA degree.

As noted above in Table II, CFAs held less NTS at the height of the bubble than non-CFAs. Based on column (4) in Table II, CFAs held roughly 2.2 percentage points ($t = 2.5$) less NTS than non-CFAs in 2007. This direct effect already suggests that formal training is a partial substitute for on-the-job experience. In Table X, we explore the interaction between formal training and on-the-job experience. The table shows that the interaction term is negative, suggesting that formal training can mitigate the effects of inexperience. However, the estimated coefficient is only marginally significant, so this evidence is just suggestive.¹⁶

H. Trading by inexperienced managers during the crisis

Finally, we turn to manager behavior during the crisis. Figure 3 shows that the average *NTS share* for inexperienced bond managers falls from roughly 8.5% in 2007Q2 to 3.5% in 2009Q4. By contrast, the average *NTS share* of more seasoned managers declines modestly from 4.5% to 3.5% over this same period. In this section, we seek to understand this pattern, exploring how inexperienced managers responded once the crisis arrived.

NTS share could have declined during the crisis for two reasons. First, managers could have sold NTS. Second, losses on the underlying collateral could reduce reported par NTS holdings even in the absence of any active selling. This can happen even though *NTS Share* is based on the par value of NTS holdings, not the market value. The reason is that when securitization trusts suffer losses on the underlying collateral, they go into “early amortization” and write down the par value of their outstanding bonds. Thus, collateral losses result in reductions in the par value of NTS held.¹⁷

¹⁶ In untabulated results, we find no evidence that having an MBA is related to *NTS share*.

¹⁷ Mortgage prepayments also reduce the par value of outstanding bonds. During the crisis periods, defaults played a larger role than prepayments in amortization.

To separate these two forces, we use quarterly data from Bloomberg on the time series of outstanding par amounts for each security. Using this data, we can decompose the total change in par NTS held by each fund into a part due to active selling and a part due to passive reductions in outstanding par. We analyze each component in Table XI, running specifications of the form:

$$y_{it} = \alpha_{objective(i) \times t} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot Flows_{it} + \beta_3 \cdot NTS\ Share_{it-1} + \gamma' \mathbf{x}_{it} + \varepsilon_{it}. \quad (9)$$

The fund-quarter panel in Table XI covers the crisis period from 2007Q3 to 2009Q2 and includes roughly 650 funds per quarter. The first three columns in Table XI show OLS regressions and the next three columns add investment-objective-by-quarter fixed effects.

In Panel A, y_{it} is the par value of NTS sold in a quarter scaled by the fund's total par fixed-income holdings. The coefficient in column (5) shows that inexperienced managers sell $\beta_1 = 0.4$ ($t = 2.8$) percentage points more NTS per quarter than seasoned managers. Over the eight-quarter crisis period, this cumulates to a 3.4% differential reduction in NTS portfolio share.

There are several possible explanations for this result. First, inexperienced managers may have revised their beliefs more dramatically than seasoned managers at the onset of the crisis. Second, inexperienced managers may have been forced to sell more NTS because they suffered larger outflows in the crisis.¹⁸ Third, it could be the case that inexperience is simply proxying for the initial level of NTS holdings and all funds with high initial NTS holdings sold them during the crisis. In column (6), we control for the second and third possibilities adding fund flows, $Flows_{it}$, and lagged NTS holdings, $NTS\ Share_{it-1}$, as controls. Both $Flows_{it}$ and $NTS\ Share_{it-1}$ are statistically significant. Additional quarterly outflows of one percentage point of total net assets result in $\beta_2 = 0.08$ ($t = 4.2$) percentage points more sales of NTS. Similarly, a one percentage point increase in $NTS\ Share_{it-1}$ is associated with $\beta_3 = 0.07$ ($t = 2.7$) percentage points more sales of NTS. The independent effect of inexperience is attenuated slightly by the addition of these controls, but remains large and statistically significant at the 10% level ($\beta_1 = 0.2$, $t = 1.8$).

In Panel B, y_{it} is the decline in par value of NTS due to passive amortization scaled by the fund's total par fixed-income holdings. The coefficient in column (5) shows that NTS holdings of inexperienced managers amortize $\beta_1 = 0.2$ ($t = 3.1$) percentage points more per quarter than

¹⁸ In untabulated results we find that inexperienced managers suffer lower returns and worse outflows during the crisis, largely on account of their higher NTS holdings.

the NTS holdings of seasoned managers. This cumulates to a 1.9% total reduction in NTS portfolio share relative to seasoned managers. Thus, inexperienced managers seem to have purchased NTS that *ex post* realized larger losses than those purchased by seasoned managers. This is consistent with the evidence in Table IV, which showed that inexperienced managers purchased NTS that were higher yielding and therefore riskier *ex ante*. Column (6) shows that funds with high NTS holdings also purchased NTS that realized larger losses *ex post*. A one percentage point increase in $NTS\ Share_{it-1}$ is associated with $\beta_3 = 0.07$ ($t = 7.1$) percentage points more amortization per quarter. The independent effect of inexperience is again attenuated, but remains large and statistically significant ($\beta_1 = 0.1$, $t = 2.0$).

These results are consistent with the idea that optimistic beliefs drove the NTS holdings of inexperienced managers. Their optimism made riskier NTS attractive, and once their beliefs were invalidated during the crisis they aggressively sold these holdings.

I. Alternative explanations

In this section, we discuss three alternative explanations for our findings.

I.1. Inexperienced managers have different risk preferences

A first alternative explanation for our results is that inexperienced managers are rationally acting as though they are more risk-loving than seasoned managers. This would be the case if, for instance, more risk-loving investors seek out inexperienced managers. However, our results are all robust to including fund objective fixed effects, so they are not driven by a tendency for inexperienced managers to run funds with riskier objectives. Moreover, this alternative cannot explain our results on the personal experiences of managers (Tables VI to X). Furthermore, fact that inexperienced managers sell more NTS in the crisis (Table XI) suggests that they revised their view on NTS more than seasoned managers as the crisis set in.

I.2. Inexperienced managers face different incentives

A second alternative interpretation of our results on manager experience is that they reflect incentive problems. For instance, Chevalier and Ellison (1997) argue that the shape of the relationship between fund flows and past performance determines the risk-taking incentives

facing the fund and show that performance-flow is stronger in younger funds.¹⁹ While differences in incentives might explain our basic finding that inexperienced managers owned more NTS in 2007, they would not explain our results within the set of inexperienced and seasoned managers. Specifically, is it not obvious how, say, differences in recent firsthand experiences would alter managers' risk-taking incentives.

Furthermore, we can use our data to directly examine whether inexperienced managers faced different incentives than more seasoned managers. Figure 5 shows the performance-flow relationships faced by inexperienced and seasoned managers. The figure shows that inexperienced bond mutual fund managers did not face stronger or more convex performance-flow relationships. In untabulated regressions, we find similar results. When we estimate monthly regressions of fund flows (scaled by lagged assets) on lagged fund returns, we find that fund flows respond strongly to past performance, consistent with the prior literature. However, when we interact past fund returns with manager experience, we do not find a stronger performance-flow relationship for inexperienced managers.²⁰

1.3. Differential survival of conservative bond managers

A third alternative explanation for our results involves the differential survival of conservative versus risk-loving bond managers. Under this alternative, individual bond fund managers vary in their risk preferences—effectively there is a manager fixed-effect in risk-aversion—and more risk-loving managers are terminated at a higher rate than risk-averse managers. If the distribution of risk preferences is the same for each cohort of new managers, then the higher termination rate of risk-loving managers means that the composition of the cohort will change over time: younger cohort of managers will tend to be more risk-loving on average. Beliefs and personal experience play no role in this story, but less seasoned managers would still hold more NTS than seasoned managers on average.

While this kind of differential manager survival can explain our basic finding that

¹⁹ Chevalier and Ellison (1999) argue that because younger managers are more likely to be terminated for bad performance, they in fact face a more concave payoff function and therefore should take less risk.

²⁰ We have also examined fund tracking error and do not find any evidence that inexperienced managers have larger tracking error. Thus, the higher nontraditional share of inexperienced managers does not appear to be part of a broader pattern of deliberate risk taking which would be reflected in a larger tracking error.

inexperienced managers owned more NTS in 2007, it cannot explain our results within inexperienced and seasoned managers. For instance, in the differential survivor story, there is no reason for inexperienced managers in areas with high local house price appreciation to buy more NTS (Table V). Similarly, the survivorship story cannot explain the effects of 1998 fund or fund family outcomes on the 2007 NTS holdings of inexperienced managers (Tables VII and VIII).

Overall, our results seem most parsimoniously explained by the role of firsthand experiences in shaping fund manager beliefs.

V. Conclusion

Nontraditional securitizations—nonprime RMBS and CDOs—were at the heart of the recent financial crisis. The demand for these securities helped feed the housing boom during the mid-2000s, while rapid declines in their prices during 2007 and 2008 generated large losses for intermediaries, imperiling their soundness and triggering a full-blown crisis. Using micro-data on mutual funds' fixed-income holdings, we find that inexperienced were far more likely to acquire nontraditional securitizations during the boom. Furthermore, managers' past personal experiences exert a strong effect on their propensity to buy nontraditional securitizations.

The evidence in this paper suggests that, much like forest fires, the process generating financial crises may be highly path-dependent. By consuming dry underbrush, a series of small fires can lower the risk of a larger conflagration that might destroy an entire forest. Indeed, forest managers deliberately engineer “controlled burns” for this exact reason.

This path-dependent view of investor belief-formation has novel implications for financial stabilization policy. Specifically, it suggests that overly eager stabilization policies may be counter-productive: by smoothing out the normal bumps in the road, policymakers may encourage the very types of overoptimistic thinking that generate severe crises. In this way, a dynamic view of investor belief-formation yields prescriptions similar to those associated with the goal of minimizing moral hazard: policymakers need to let investors suffer the consequences of the moderate mistakes they make every few years. However, in this view, the desirability of such policies is less about creating appropriate *incentives* to manage risk and instead is more about promoting *sensible beliefs* about the trade-off between risk and return. The occasional market disruption or cyclical downturn may help to root out the kinds of complacent Goldilocks thinking that can fuel credit booms.

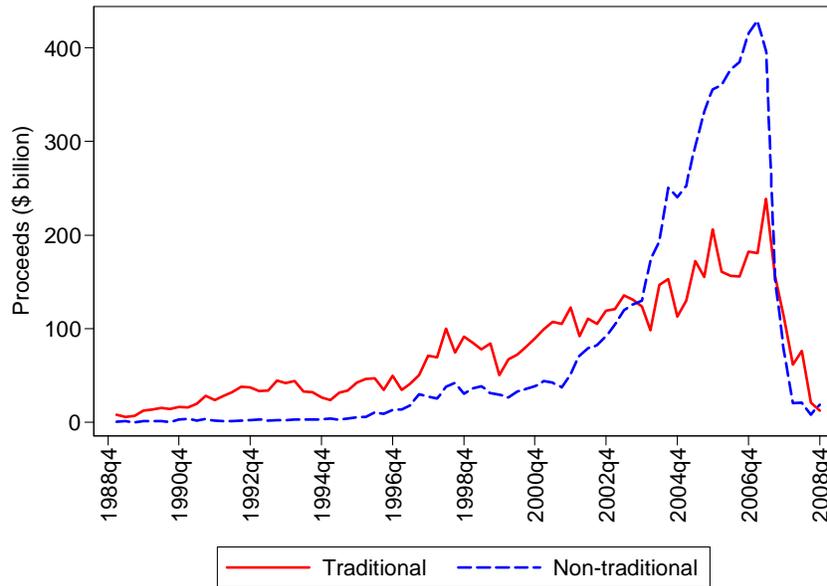
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Panel A: Quarterly issuance of traditional and nontraditional securitizations



Panel B: Credit spreads on AAA-rated securitization tranches

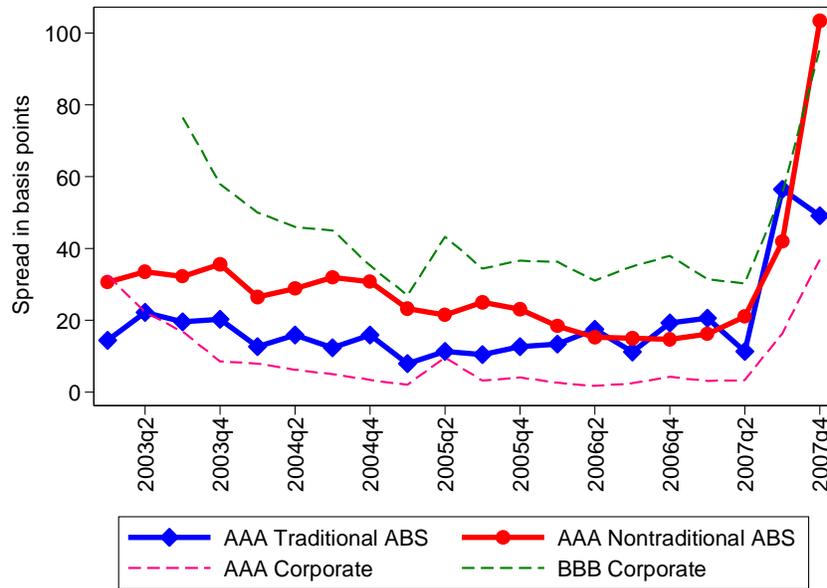


Figure 1. Issuance and credit spreads on traditional and nontraditional securitizations. This figure shows quarterly issuance volume and credit spreads on traditional and nontraditional securitizations based on SDC data. Traditional securitizations include CMBS, prime RMBS, consumer ABS, and other ABS. Nontraditional securitizations include non-prime RMBS and CDOs. Panel A plots quarterly issuance of traditional and nontraditional securitizations. Panel B plots the credit spreads on newly issued AAA-rated securitizations. Each quarter we compute the value-weighted average spread on traditional and nontraditional securitizations. To avoid benchmarking issues we restrict attention to the spreads on floating rate notes indexed to LIBOR. For reference we plot the average secondary spreads over LIBOR (based on interest rate swaps) on 3-year AAA and BBB-rated corporate bonds from Barclays.

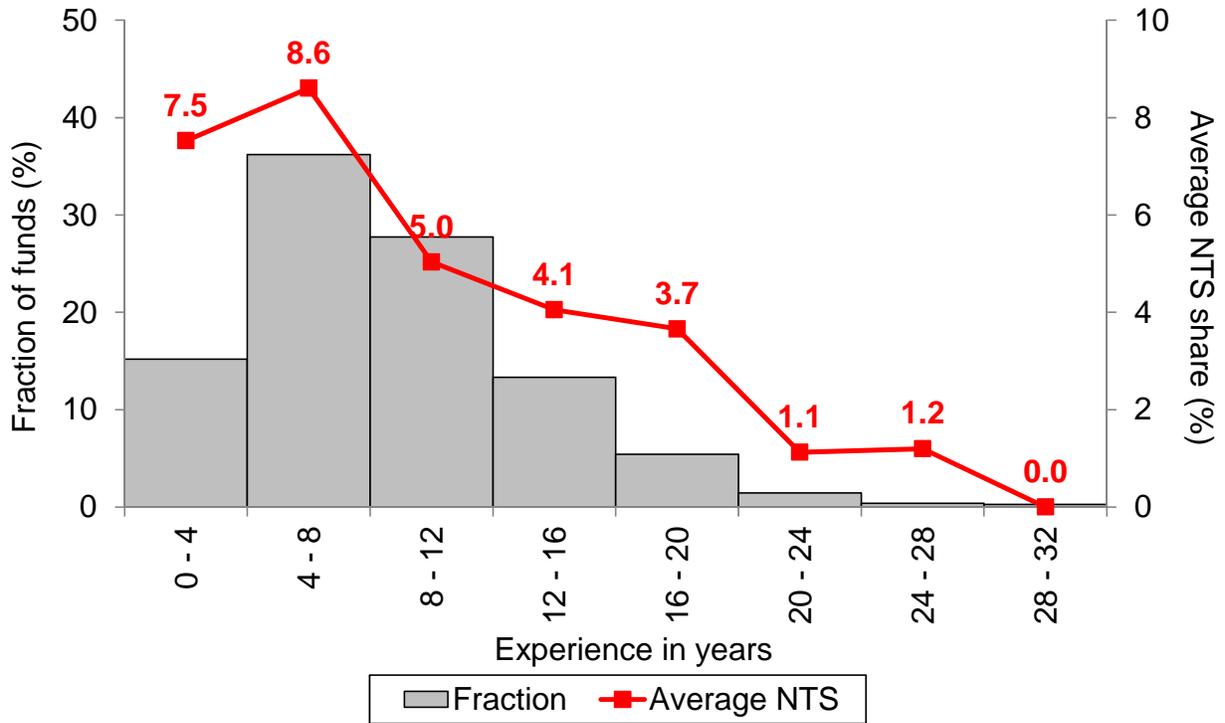


Figure 2. Bond manager experience in years and 2007 average NTS holdings. The histogram shows the 2007 distribution of bond manager experience based on 4-year bins. Experience is measured as of 2004Q4. Experience is the number of years an individual has been managing a mutual fund. For team-managed funds we take the average of individual managers' experience in years. For each 4-year bin, we report the average nontraditional securitization share in percentage points as of 2007.

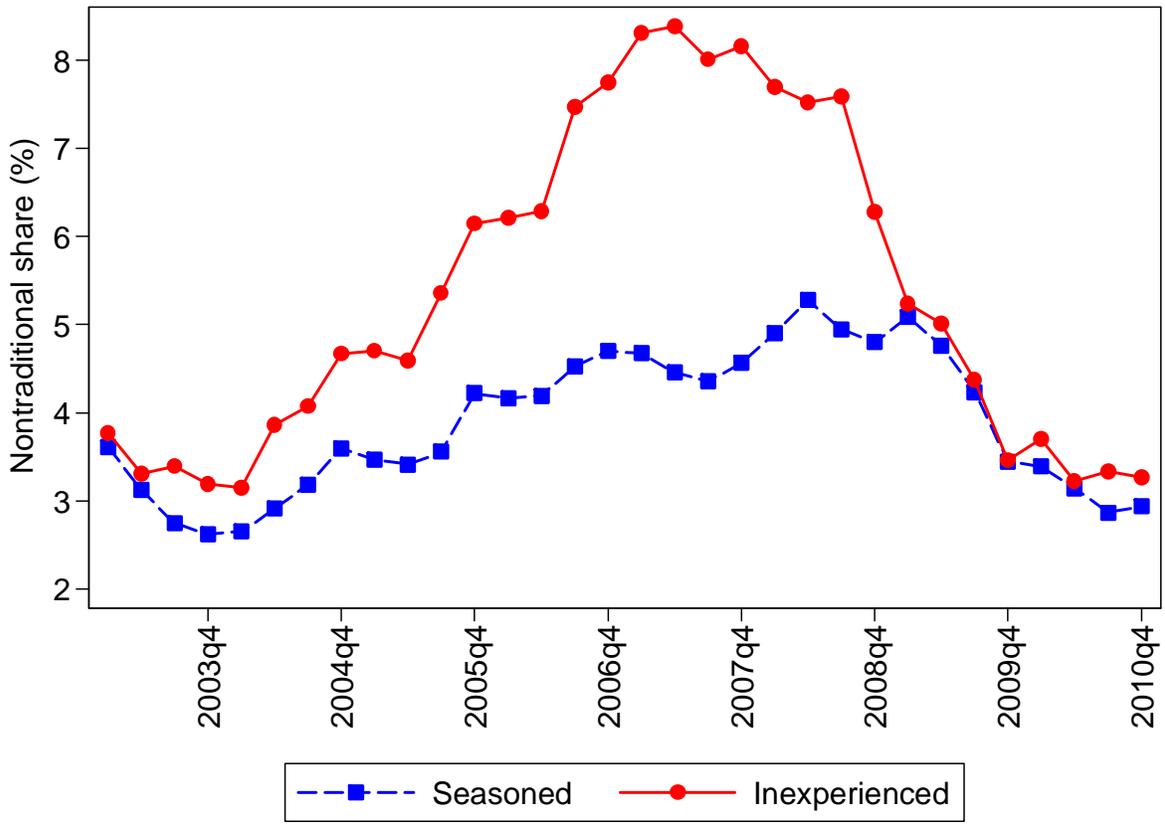


Figure 3. Quarterly NTS holdings of seasoned and inexperienced bond fund managers. This figure shows the average nontraditional share of bond mutual funds managed by seasoned and inexperienced portfolio managers from 2003Q1 to 2010Q4. We split bond mutual funds into two groups based on the median value of the fund manager’s experience measured as of 2004Q4. For team-managed funds we take the average of individual managers’ experience. Nontraditional share is total par holdings of nontraditional securitizations, defined as nonprime RMBS and CDOs, as a fraction of a mutual fund’s par fixed-income holdings.

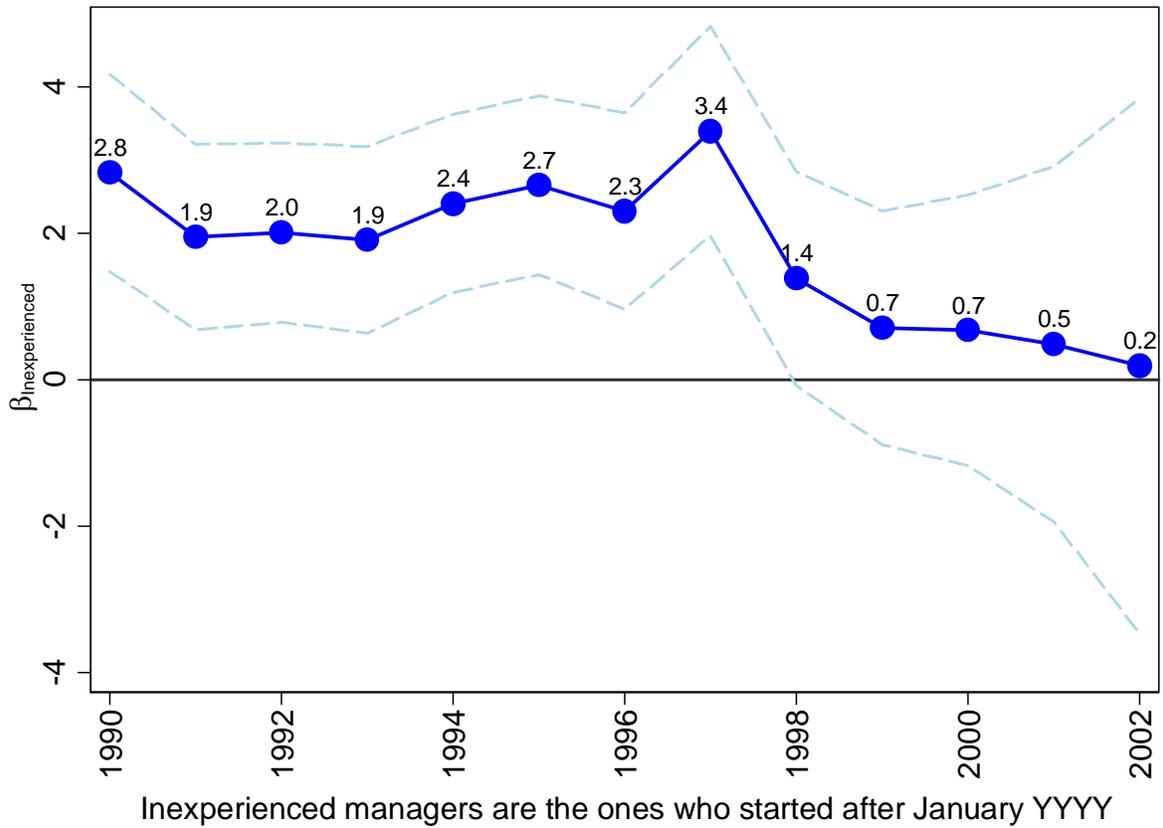


Figure 4. Manager experience does not accrue linearly over time. This figure plots the coefficients $\beta_{Inexperienced}$ from estimating cross-sectional regressions of mutual funds' 2007 nontraditional share on fund manager inexperience defined using different cut-off dates as in Panel A of Table VII:

$$NTS\ share_i = \alpha_{objective(i)} + \beta_{Inexperienced} \cdot 1\{Manager\ starts\ after\ 1/1/YYYY\} + \gamma'x_i + \varepsilon_i.$$

The dash lines shows confidence intervals based on robust standard errors.

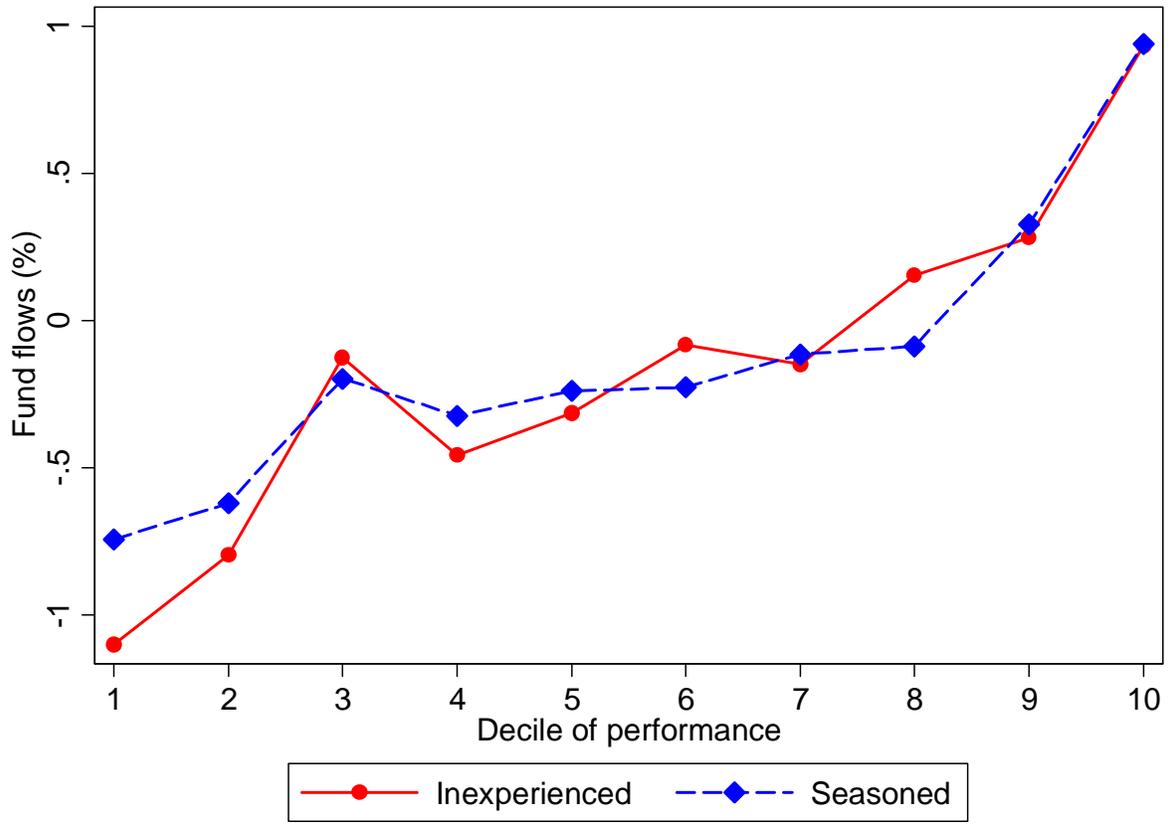


Figure 5. Performance flow relationship for seasoned and inexperienced bond fund managers. This figure reports the strength of the performance-flow relationship for bond mutual funds managed by seasoned versus inexperienced managers. Fund flows are winsorized at the first and ninety-ninth percentiles. Using data from 2003 to 2010, we first adjust monthly fund returns and net flows for objective-month fixed effects. The figure then shows the mean of adjusted fund flows by decile of adjusted performance. Each month we define seasoned funds as those with fund managers above the median of experience across all funds at that point time.

Table I
Summary Statistics

This table reports summary statistics for our 2003 to 2010 annual panel of bond mutual funds. Our sample of mutual funds consists of domestic taxable bond funds and hybrid stock/bond funds, excluding money market funds, index bond funds, and Treasury-only government bonds funds. Specifically, we use funds with the following Lipper investment objective codes in CRSP: “A” (Corporate debt funds A-rated), “ARM” (Adjustable rate mortgage funds), “B” (Balanced funds), “BBB” (Corporate debt funds BBB-rated), “CA” (Capital appreciation funds), “FLX” (Flexible income funds), “FX” (Flexible portfolio funds), “GB” (General bond funds), “GNM” (GNMA funds), “GUS” (General U.S. government funds), “HY” (High yield funds), “I” (Income funds), “IID” (Intermediate investment grade debt funds), “IUG” (Intermediate U.S. government funds), “MSI” (Multi-sector income funds), “SID” (Short investment grade debt funds), “SII” (Short-intermediate investment grade debt funds), “SIU” (Short-intermediate U.S. government funds), “SUS” (Short U.S. government funds), “USM” (U.S. mortgage funds), and “USO” (Ultra-short obligation funds). Our manager-level variables are from Morningstar and are measured as of 2004Q4. For team-managed funds, these variables reflect the average of each of the fund’s managers. *Experience* is the number of years since we first observe each manager in Morningstar. *CFA* is the fraction of managers who are Chartered Financial Analysts. *Fund TNA*, *Fund age*, *Family TNA*, *Family age*, and *Family taxable bond share* are from the CRSP mutual fund database. *Fund par fixed income assets* is from eMaxx. *NTS share*, *TS share*, and *GSE MBS share* are portfolio shares as a fraction of par fixed-income holdings and are derived from eMAXX.

Variable	N	Mean	Median	St Dev	Min	Max
Manager-level variables						
<i>Experience</i> (years)	5,983	8.52	7.87	4.51	0.00	29.06
<i>CFA</i> (fraction)	5,983	0.48	0.50	0.40	0.00	1.00
<i>Number of managers</i>	5,983	2.77	2.00	2.47	1.00	21.00
<i>Team managed</i> (indicator)	5,983	0.67	1.00	0.47	0.00	1.00
Fund-level variables						
<i>Fund TNA</i> (\$ billion)	5,983	1.56	0.30	7.06	0.00	236.62
<i>Fund par fixed income assets</i> (\$ billion)	5,983	1.07	0.23	4.14	0.00	175.96
<i>Fund age</i> (years)	5,983	15.90	13.63	11.86	0.15	83.80
<i>Nontraditional securitization share</i> (%)	5,983	4.61	0.96	9.03	0.00	100.00
<i>Traditional securitization share</i> (%)	5,983	10.04	5.15	13.34	0.00	93.89
<i>GSE MBS share</i> (%)	5,983	24.66	17.27	26.14	0.00	100.00
Family-level variables						
<i>Family TNA</i> (\$ billion)	5,983	123.52	29.20	262.56	0.00	1,683.2
<i>Family age</i> (years)	5,983	42.40	34.30	25.14	0.68	86.52
<i>Family taxable bond share</i> (%)	5,983	39.43	32.45	25.83	0.00	100.00

Table II
Impact of Experience on 2007 NTS Holdings

This table reports the results of cross-sectional regressions of bond mutual funds' 2007 holdings of nontraditional securitizations on the portfolio manager's experience and various fund characteristics:

$$y_i = \alpha_{objective(i)} + \beta \cdot Inexperienced_i + \gamma' \mathbf{x}_i + \varepsilon_i.$$

Panel A uses a dummy indicator equal to 1 for managers with below median experience as of 2004Q4, while Panel B shows the same result for a continuous measure of inexperience: $-1 \times$ years of experience. The dependent variables in columns 1 to 4 is the nontraditional share ($y_i = NTS\ share_i$), while the dependent variable in columns 5 to 8 is an indicator equal to 1 if the fund holds NTS, $Has\ NTS_i = 1 \{NTS\ share_i > 0\}$. Fund objective fixed effects are included in columns 3,4, 7, and 8. Robust t -statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Dummy indicator for inexperienced managers								
	$y_i = NTS\ share_i$ (%)				$y_i = Has\ NTS_i$			
<i>Inexperienced manager</i>	3.932 [4.77]	3.560 [4.56]	3.467 [4.65]	3.376 [4.66]	0.097 [2.86]	0.090 [2.75]	0.101 [3.19]	0.107 [3.45]
<i>CFA</i>		-2.813 [-3.10]		-2.215 [-2.48]		-0.058 [-1.38]		-0.040 [-0.99]
<i>Team managed</i>		2.857 [3.82]		2.325 [3.41]		0.165 [4.53]		0.125 [3.63]
$\log(Fund\ TNA)$		0.391 [1.23]		0.473 [1.56]		0.038 [2.94]		0.034 [2.89]
$\log(Family\ TNA)$		0.003 [0.01]		-0.186 [-0.68]		0.029 [2.54]		0.029 [2.74]
$\log(Fund\ age)$		-1.636 [-2.05]		-0.662 [-0.89]		-0.042 [-1.51]		-0.009 [-0.32]
$\log(Family\ age)$		-0.773 [-0.91]		-0.574 [-0.73]		-0.021 [-0.66]		0.018 [0.59]
<i>Family taxable bond share (%)</i>		0.075 [4.15]		0.055 [3.18]		0.002 [2.75]		0.002 [2.72]
Fund objective fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	757	757	757	757	757	757	757	757
R-squared	0.03	0.11	0.19	0.23	0.01	0.11	0.19	0.27
Panel B: Continuous measure of inexperience								
	$y_i = NTS\ share$ (%)				$y_i = Has\ NTS$			
<i>Inexperience = -1 × years</i>	0.355 [4.66]	0.277 [3.69]	0.283 [4.07]	0.255 [3.66]	0.014 [3.75]	0.013 [3.54]	0.015 [4.35]	0.016 [4.54]
<i>CFA</i>		-2.873 [-3.12]		-2.307 [-2.52]		-0.063 [-1.50]		-0.047 [-1.17]
<i>Team managed</i>		2.832 [3.62]		2.337 [3.28]		0.155 [4.20]		0.113 [3.23]
$\log(Fund\ TNA)$		0.366 [1.13]		0.425 [1.39]		0.040 [3.09]		0.036 [3.03]
$\log(Family\ TNA)$		0.042 [0.14]		-0.141 [-0.51]		0.029 [2.55]		0.029 [2.78]
$\log(Fund\ age)$		-1.590 [-2.02]		-0.588 [-0.80]		-0.033 [-1.18]		0.003 [0.09]
$\log(Family\ age)$		-0.854 [-1.00]		-0.671 [-0.85]		-0.024 [-0.76]		0.014 [0.49]
<i>Family taxable bond share (%)</i>		0.073 [3.97]		0.053 [3.01]		0.002 [2.66]		0.002 [2.65]
Fund objective fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	757	757	757	757	757	757	757	757
R-squared	0.02	0.10	0.18	0.22	0.02	0.12	0.19	0.28

Table III
Robustness: Impact of Experience on 2007 NTS Holdings

This table reports a battery of robustness exercises for our main result. Specifically, we report cross-sectional regressions of bond mutual funds' 2007 holdings of nontraditional securitizations on the portfolio manager's experience and various fund characteristics:

$$y_i = \alpha_{objective(i)} + \beta \cdot Inexperienced_i + \gamma' \mathbf{x}_i + \varepsilon_i.$$

For each robustness exercise, we show results measuring inexperience using an indicator for below-median experience and using our continuous measure of experience in years. We also show results using both our continuous holding measure ($y_i = NTS\ share_i$) as well as an indicator for funds holding any NTS ($y_i = Has\ NTS_i$). All specifications include the full suite of controls from Table II as well as fund objective fixed effects. Robust t -statistics are shown in square brackets below the coefficient estimates. Row (1) repeats our baseline results from Table II. We first modify our sample weighting or subsample. Row (2) show analogous results weighting each fund by its total net assets. Row (3) shows results restricting attention to the 250 largest funds. We next modify our dependent variable. Row (4) shows results using $y_i = NTS_i/TNA_i$ in place of $y_i = NTS_i/BOND_i$. Rows (5) and (6) decompose NTS holdings into AAA holdings and non-AAA holdings based on Moody's credit ratings. (We classify tranches that receive a rating of "NR" as AAA since these NR are almost always super-senior tranches that were not rated. However, this makes little difference.) Thus, when the dependent variable is measure continuously, the sum of the coefficients in rows (5) and (6) equals the coefficient in row (1). Rows (7) and (8) decompose NTS holdings into Nonprime RMBS and CDO holdings. In rows (9) and (10) the dependent variable is based on the fraction of traditional securitization ($TS\ share$) and GSE-backed MBS ($GSE\ MBS\ share$) in each fund's portfolio. Finally, we modify the independent variable. Specifically, row (11) shows the results when experience is defined as of 2007 instead of 2004.

		<i>N</i>	<i>Inexperienced dummy</i>						<i>Inexperience = -1 × years</i>					
			<i>y_i = NTS share_i (%)</i>			<i>y_i = Has NTS_i</i>			<i>y_i = NTS share_i (%)</i>			<i>y_i = Has NTS_i</i>		
			<i>β</i>	[<i>t</i>]	<i>R</i> ²	<i>β</i>	[<i>t</i>]	<i>R</i> ²	<i>β</i>	[<i>t</i>]	<i>R</i> ²	<i>β</i>	[<i>t</i>]	<i>R</i> ²
(1)	Baseline	757	3.376	[4.66]	0.23	0.107	[3.45]	0.27	0.255	[3.66]	0.22	0.016	[4.54]	0.28
	<u>Modify weighting/sample</u>													
(2)	Value-weighted	757	3.498	[3.68]	0.39	0.172	[3.17]	0.37	0.513	[6.55]	0.46	0.033	[4.20]	0.50
(3)	Top 250 funds	250	2.566	[2.16]	0.39	0.079	[1.55]	0.28	0.301	[3.20]	0.40	0.018	[3.15]	0.31
	<u>Modify dependent variable</u>													
(4)	<i>NTS/TNA</i>	757	4.75	[4.12]	0.17	0.107	[3.45]	0.27	0.282	[3.62]	0.16	0.016	[4.54]	0.28
(5)	<i>NTS_{AAA} share</i>	757	2.46	[4.04]	0.23	0.089	[2.91]	0.34	0.125	[2.77]	0.21	0.011	[3.24]	0.34
(6)	<i>NTS_{Oth} share</i>	757	0.91	[3.41]	0.08	0.060	[1.78]	0.21	0.130	[2.69]	0.08	0.013	[3.56]	0.22
(7)	<i>NTS_{Nonprime RMBS} share</i>	757	2.86	[4.11]	0.24	0.071	[2.34]	0.34	0.180	[3.32]	0.23	0.010	[2.90]	0.34
(8)	<i>NTS_{CDO} share</i>	757	0.52	[2.74]	0.05	0.109	[3.53]	0.13	0.075	[1.72]	0.06	0.013	[3.85]	0.13
(9)	<i>TS share</i>	757	1.22	[1.31]	0.32	0.078	[3.19]	0.31	0.197	[1.59]	0.32	0.009	[3.06]	0.31
(10)	<i>GSE MBS share</i>	757	-2.72	[-2.09]	0.57	0.006	[0.37]	0.65	-0.164	[1.08]	0.57	0.000	[0.20]	0.65
	<u>Modify independent variable</u>													
(11)	2007 experience	757	1.043	[1.41]	0.21	0.106	[3.44]	0.27	0.124	[2.43]	0.21	0.011	[3.71]	0.27

Table IV
Spreads on NTS Holdings

This table reports the results of cross-sectional regressions of the new-issue spreads on mutual funds' 2007 nontraditional securitization holdings on manager inexperience:

$$y_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \gamma' \mathbf{x}_i + \varepsilon_i.$$

In Panel A, the dependent variable is the par-weighted average new issue spread on funds' 2007 NTS holdings. In panel B, the new issue spreads are deviations from the average spread for nontraditional securitizations issued in the same quarter. In panel C, the new issue spreads are deviations from the average spread for nontraditional securitizations with the same initial rating and issued in the same quarter. Fund objective fixed effects and the controls from Table II are included as indicated in the table. Robust *t*-statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)
Panel A: y_i = Raw NTS spreads				
<i>Inexperienced manager</i>	16.956 [2.73]	15.475 [2.44]	9.369 [1.82]	6.695 [1.38]
<i>Constant</i>	38.751 [13.55]	82.394 [3.15]	42.74 [13.25]	95.959 [3.71]
Controls	No	Yes	No	Yes
Fund objective fixed effects	No	No	Yes	Yes
Observations	350	350	350	350
R-squared	0.02	0.05	0.29	0.33
Panel B: y_i = NTS spreads adjusted for quarter-of-issue				
<i>Inexperienced manager</i>	17.276 [2.87]	15.855 [2.58]	10.009 [2.02]	7.367 [1.56]
<i>Constant</i>	10.571 [3.75]	50.673 [1.99]	14.391 [4.57]	64.745 [2.61]
Controls	No	Yes	No	Yes
Fund objective fixed effects	No	No	Yes	Yes
Observations	350	350	350	350
R-squared	0.02	0.06	0.30	0.34
Panel C: y_i = NTS spreads adjusted for rating and quarter-of-issue				
<i>Inexperienced manager</i>	1.25 [0.49]	0.097 [0.04]	0.205 [0.09]	-1.382 [-0.57]
<i>Constant</i>	5.003 [2.82]	21.951 [2.11]	5.552 [3.06]	23.673 [2.04]
Controls	No	Yes	No	Yes
Fund objective fixed effects	No	No	Yes	Yes
Observations	350	350	350	350
R-squared	0.00	0.07	0.10	0.15

Table V
Impact of Experience on the Evolution of NTS Holdings: 2003 to 2010

This table reports the results of separate cross-sectional regressions for $t = 2003$ to 2010 of bond mutual funds' holdings of nontraditional securitizations on the portfolio manager's experience and various fund characteristics:

$$NTS\ share_{it} = \alpha_{objective(i),t} + \beta_t \cdot Inexperienced_i + \gamma_t' \mathbf{x}_{it} + \varepsilon_{it}.$$

Inexperienced manager is a dummy indicator equal to 1 for managers with below median experience as of 2004Q4 and does not vary over time for a given mutual fund. The dependent variable is the nontraditional share in year t in percentage points. The cross-sectional regressions include fund objective fixed effects. Robust t -statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2003	2004	2005	2006	2007	2008	2009	2010
<i>Inexperienced manager</i>	0.325 [0.77]	0.703 [1.80]	1.035 [2.40]	1.794 [3.10]	3.376 [4.66]	2.169 [3.01]	-0.166 [-0.25]	0.221 [0.34]
<i>CFA</i>	0.296 [0.67]	0.555 [1.18]	0.321 [0.61]	-0.773 [-1.20]	-2.215 [-2.48]	-2.321 [-2.59]	-0.489 [-0.64]	-0.811 [-1.01]
<i>Team managed</i>	0.641 [1.38]	0.047 [0.11]	0.950 [2.09]	2.148 [4.26]	2.325 [3.41]	2.041 [2.88]	2.242 [3.94]	0.500 [0.68]
$\log(Fund\ TNA)$	-0.185 [-0.53]	0.199 [0.92]	0.424 [1.65]	0.501 [1.66]	0.473 [1.56]	-0.209 [-0.75]	-0.461 [-1.83]	-0.344 [-1.63]
$\log(Family\ TNA)$	0.243 [0.65]	0.041 [0.22]	-0.052 [-0.25]	-0.070 [-0.28]	-0.186 [-0.68]	-0.021 [-0.09]	-0.006 [-0.03]	0.054 [0.28]
$\log(Fund\ age)$	0.286 [0.62]	-0.380 [-0.99]	-1.179 [-2.04]	-0.855 [-1.28]	-0.662 [-0.89]	0.546 [0.87]	0.745 [1.43]	0.366 [0.82]
$\log(Family\ age)$	-0.083 [-0.10]	0.599 [1.38]	0.125 [0.26]	0.210 [0.32]	-0.574 [-0.73]	-1.535 [-1.88]	-0.234 [-0.34]	-0.216 [-0.37]
<i>Family taxable bond share (%)</i>	0.018 [1.08]	0.028 [2.52]	0.035 [2.80]	0.043 [3.29]	0.055 [3.18]	0.056 [3.43]	0.042 [2.52]	0.027 [2.13]
Fund objective fixed effects	Yes							
Observations	767	797	818	785	757	743	685	631
R-squared	0.28	0.34	0.34	0.31	0.23	0.21	0.14	0.10

Table VI
The Impact of Experienced Local House Price Appreciation on 2007 NTS Holdings

This table reports the results of cross-sectional regressions of mutual funds' 2007 nontraditional share during 2007 on portfolio manager's experience and local house price appreciation

$$NTS\ share_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot High\ local\ HPA_i + \beta_3 \cdot Inexperienced_i \times High\ local\ HPA_i + \gamma'x_i + \varepsilon_i.$$

Manager experience is measured as of 2004Q4. Inexperienced manager is a binary variable equal to 1 for funds with below median experience. Local house price appreciation is the annualized change in housing prices from 2003 to 2006 for the MSA in which the investment manager is located. We use the all-transactions index from the Federal Housing Finance Agency. *High local HPA* is an indicator for investment managers who experienced local home price appreciation in the top tercile. The same controls as in Table II are included in the regressions but are not reported. Fund objective fixed effects are included as indicated in the table below. *t*-statistics are robust to clustering by MSA and are shown in square brackets.

	(1)	(2)	(3)	(4)
<i>Inexperienced manager</i>	3.421 [3.75]	1.896 [1.48]	3.226 [3.54]	1.760 [1.39]
<i>High local HPA</i>	1.969 [2.16]	0.316 [0.40]	2.312 [2.13]	0.715 [0.84]
<i>High local HPA</i> <i>× Inexperienced</i>		3.259 [2.05]		3.175 [1.94]
Controls	Yes	Yes	Yes	Yes
Objective Fixed Effects	No	No	Yes	Yes
Observations	757	757	757	757
R-squared	0.12	0.12	0.24	0.24

Table VII
The Impact of Prior Manager Return Experiences on 2007 NTS Holdings

This table reports the results of cross-sectional regressions of mutual funds 2007 nontraditional share on the 1998 investment outcome experienced by the fund manager and the investment outcome experienced by the fund family:

$$NTS\ share_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot HighAvgReturn_i + \beta_3 \cdot HighMinReturn_i + \beta_4 \cdot DistantMinReturn_i + \gamma'x_i + \varepsilon_i.$$

The dependent variable is the nontraditional share in 2007 in percentage points (*NTS share_{it}*). *Inexperienced manager* is a dummy indicator equal to 1 for managers with below median experience as of 2004Q4. We compute each manager's minimum return from 1995 to 2005 (the average across managers for team-managed funds). *HighMinReturn* is an indicator for managers with minimum returns in the top two terciles. We compute each manager's average return from 1995 to 2005 (the average across managers for team-managed funds). *HighAvgReturn* is an indicator for managers with average returns in the top two terciles. *DistantMinReturn* is a continuous measure that equals 1 if a manager's minimum return from 1995 to 2005 was in 1995, that equals 0 if the minimum was in 2005, etc. Formally, $DistantMinReturn = (2005 - YearMin - 1995) / (2005 - 1995)$. Fund objective fixed effects and the controls from Table II are included as indicated in the table. Robust *t*-statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Inexperienced manager</i>	3.576 [4.58]	3.093 [3.92]	3.745 [4.46]	3.431 [4.73]	3.087 [4.12]	3.698 [4.56]
<i>High average return</i>	0.389 [0.45]	-0.808 [-0.79]	-1.26 [-1.27]	0.525 [0.59]	-0.29 [-0.27]	-0.762 [-0.73]
<i>High min return</i>		2.696 [2.94]	2.815 [3.05]		1.908 [1.84]	2.191 [2.12]
<i>Distant min return</i>			5.932 [2.73]			5.712 [2.82]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Objective Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	755	755	755	755	755	755
R-squared	0.11	0.12	0.13	0.23	0.23	0.24

Table VIII
Personal Experiences during Prior Market Disruptions:
The Impact of 1998 Manager Experiences on 2007 NTS Holdings

Panel A reports the results of cross-sectional regressions of mutual funds' 2007 nontraditional share on fund manager inexperience defined using different cut-off dates:

$$NTS\ share_i = \alpha_{objective(i)} + \beta \cdot 1\{Manager\ starts\ after\ 1/1/YYYY\} + \gamma'x_i + \varepsilon_i.$$

Panel B reports the results of cross-sectional regressions of mutual funds 2007 nontraditional share on the 1998 investment outcome experienced by the manager:

$$NTS\ share_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot High\ outcome_i^{1998} + \beta_3 \cdot Inexperienced_i \times High\ outcome_i^{1998} + \gamma'x_i + \varepsilon_i.$$

The sample of funds in Panel B consists of funds with at least one portfolio manager who managed a mutual fund during 1998. Fund manager's identity is fixed as of the end of 2004. *Inexperienced_i* is a dummy is equal to one for managers above the median of the distribution of experience within the sample of managers who managed during a fund during 1998. For each manager, we measure the minimum returns and fund flows she experienced across all funds she managed during 1998. For team managed funds we then take the average across all managers with 1998 experience. *High outcome_i¹⁹⁹⁸* is an indicator for funds whose 1998 outcome is in the top two terciles. All regressions include the same controls as the specifications reported in Table II. Fund objective fixed effects are included as indicated in the table. Robust *t*-statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Manager experience does not accrue linearly over time								
	1995	1996	1997	1998	1999	2000	2001	2002
<i>Manager starts after 1/1/YYYY</i>	2.656 [4.27]	2.306 [3.37]	3.397 [4.66]	1.381 [1.86]	0.711 [0.87]	0.674 [0.71]	0.490 [0.40]	0.192 [0.10]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Objective Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	757	757	757	757	757	757	757	757
R-squared	0.22	0.22	0.23	0.21	0.21	0.21	0.21	0.21
Panel B: Impact of personal 1998 investment outcomes								
<i>Inexperienced manager</i>	2.840 [2.96]	-0.449 [-0.37]	2.882 [3.08]	-0.289 [-0.22]	2.915 [3.00]	2.719 [2.01]	3.036 [3.19]	1.918 [1.41]
<i>High returns¹⁹⁹⁸</i>	2.666 [3.12]	0.204 [0.20]	2.595 [2.48]	0.249 [0.23]				
<i>High returns¹⁹⁹⁸ × Inexperienced</i>		5.016 [2.79]		4.809 [2.72]				
<i>High flows¹⁹⁹⁸</i>					3.368 [3.71]	3.227 [3.44]	3.340 [3.74]	2.522 [2.80]
<i>High flows¹⁹⁹⁸ × Inexperienced</i>						0.294 [0.16]		1.687 [0.95]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Objective Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	493	493	493	493	487	487	487	487
R-squared	0.16	0.17	0.29	0.30	0.16	0.16	0.29	0.30

Table IX
Institutional Memory of Prior Market Disruptions:
The Impact of 1998 Fund Family Experiences on 2007 NTS Holdings

This reports the results of cross-sectional regressions of mutual funds 2007 nontraditional share on the 1998 investment outcome experienced by the fund manager and the investment outcome experienced by the fund family:

$$\begin{aligned}
 NTS\ share_i = & \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot High\ manager\ outcome_i^{1998} \\
 & + \beta_3 \cdot Inexperienced_i \times High\ manager\ outcome_i^{1998} \\
 & + \delta_2 \cdot High\ family\ outcome_i^{1998} + \delta_3 \cdot Inexperienced_i \times High\ family\ outcome_i^{1998} \\
 & + \gamma' \mathbf{x}_i + \varepsilon_i.
 \end{aligned}$$

The sample of funds consists of funds with at least one portfolio manager who managed a mutual fund during 1998. Fund manager's identity is fixed as of the end of 2004. $Inexperienced_i$ is a dummy is equal to one for managers above the median of the distribution of experience within the sample of managers who managed during a fund during 1998. For each manager, we measure the minimum returns and fund flows she experienced across all funds she managed during 1998. For team managed funds we then take the average across all managers with 1998 experience. $High\ manager\ outcome_i^{1998}$ is an indicator for managers whose 1998 outcome is in the top two terciles. We also measure the value-weighted returns and fund flows for all of the taxable bond funds in each family in 1998. $High\ family\ outcome_i^{1998}$ is an indicator for families whose 1998 outcome is in the top two terciles. All regressions include the same controls as the specifications reported in Table II. Fund objective fixed effects are included as indicated in the table. Robust t -statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Inexperienced manager</i> ¹⁹⁹⁸	3.185 [2.74]	-3.252 [-1.77]	3.303 [2.96]	-3.354 [-1.83]	2.656 [2.37]	0.966 [0.39]	2.894 [2.68]	-0.871 [-0.36]
<i>High manager returns</i> ¹⁹⁹⁸	2.855 [2.66]	1.347 [1.05]	2.812 [2.26]	1.222 [1.00]				
<i>High manager returns</i> ¹⁹⁹⁸ × <i>Inexperienced</i>		3.203 [1.48]		3.302 [1.52]				
<i>High family returns</i> ¹⁹⁹⁸	1.609 [1.55]	-1.840 [-1.42]	1.847 [1.78]	-1.730 [-1.52]				
<i>High family returns</i> ¹⁹⁹⁸ × <i>Inexperienced</i>		6.831 [3.03]		7.039 [3.34]				
<i>High manager flows</i> ¹⁹⁹⁸					3.332 [3.21]	3.440 [3.30]	2.933 [2.87]	1.920 [1.98]
<i>High manager flows</i> ¹⁹⁹⁸ × <i>Inexperienced</i>						-0.210 [-0.10]		2.169 [1.05]
<i>High family flows</i> ¹⁹⁹⁸					-0.259 [-0.23]	-1.664 [-1.23]	-0.186 [-0.17]	-1.952 [-1.51]
<i>High family flows</i> ¹⁹⁹⁸ × <i>Inexperienced</i>						2.615 [1.06]		3.421 [1.44]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Objective Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	383	383	383	383	412	412	412	412
R-squared	0.17	0.19	0.31	0.34	0.15	0.15	0.30	0.31

Table X
Experience, Training, and 2007 NTS Holdings

This table reports the results of cross-sectional regressions of mutual funds 2007 nontraditional share on the 1998 investment outcome experienced by the fund manager and the investment outcome experienced by the fund family:

$$NTS\ share_i = \alpha_{objective(i)} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot CFA_i + \beta_3 \cdot CFA_i \times Inexperienced_i + \gamma'x_i + \varepsilon_i.$$

The dependent variable is the nontraditional share in 2007 in percentage points (*NTS share_i*). *Inexperienced manager* is a dummy indicator equal to 1 for managers with below median experience as of 2004Q4. *CFA* indicates whether the portfolio manager is a Chartered Financial Analyst (it is the fraction of CFA-chartered managers for a team-managed fund). Fund objective fixed effects and the controls from Table II are included as indicated in the table. Robust *t*-statistics are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)
<i>Inexperienced manager</i>	5.385 [3.63]	5.084 [3.65]	4.497 [3.08]	4.491 [3.25]
<i>CFA</i>	-1.604 [-2.47]	-1.242 [-1.89]	-1.237 [-1.92]	-1.087 [-1.70]
<i>CFA × Inexperienced</i>	-2.913 [-1.54]	-3.164 [-1.71]	-2.056 [-1.09]	-2.287 [-1.25]
Controls	No	Yes	No	Yes
Fund objective fixed effects	No	No	Yes	Yes
Observations	757	757	757	757
R-squared	0.11	0.11	0.23	0.23

Table XI
Trading by Inexperienced Managers During the Crisis: 2007Q3–2009Q2

This table reports the results of regressions of mutual funds' quarterly trading behavior from 2007Q3 to 2009Q2 on manager inexperience, fund flows, and the lagged NTS share:

$$y_{it} = \alpha_{objective(i) \times t} + \beta_1 \cdot Inexperienced_i + \beta_2 \cdot Flows_{it} + \beta_3 \cdot NTS\ Share_{it-1} + \gamma' \mathbf{x}_{it} + \varepsilon_{it}.$$

In Panel A, the dependent variable is a measure of active NTS trading in each quarter: $y_{it} = Par\ NTS\ sold \div Par\ fixed-income\ holdings$. In Panel B, the dependent variable is a measure of passive NTS amortization in each quarter: $y_{it} = Decline\ in\ par\ NTS\ due\ to\ amortization \div Par\ fixed-income\ holdings$. As above, *Inexperienced manager* is a dummy indicator equal to 1 for managers with below median experience as of 2004Q4. Fund objective fixed effects and the controls from Table II are included as indicated in the table. *t*-statistics are based on standard errors that are robust to clustering at the fund level and are shown in square brackets below the coefficient estimates.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: $y_{it} = Par\ NTS\ sold \div Par\ fixed-income\ holdings$						
<i>Inexperienced manager</i>	0.484 [3.14]	0.418 [2.83]	0.253 [1.98]	0.477 [3.11]	0.422 [2.82]	0.237 [1.82]
<i>Fund outflows</i>			0.079 [4.24]			0.084 [4.18]
<i>Lagged NTS share</i>			0.063 [2.52]			0.068 [2.69]
Controls	No	Yes	Yes	No	Yes	Yes
Objective Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	5,314	5,314	5,314	5,314	5,314	5,314
R-squared	0.00	0.01	0.04	0.04	0.05	0.08
Panel B: $y_{it} = Decline\ in\ par\ NTS\ due\ to\ amortization \div Par\ fixed-income\ holdings$						
<i>Inexperienced manager</i>	0.273 [3.45]	0.252 [3.05]	0.095 [2.15]	0.252 [3.40]	0.242 [3.14]	0.085 [2.00]
<i>Fund outflows</i>			0.010 [1.63]			0.006 [1.07]
<i>Lagged NTS share</i>			0.074 [7.83]			0.073 [7.08]
Controls	No	Yes	Yes	No	Yes	Yes
Objective \times Quarter Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	5,314	5,314	5,314	5,314	5,314	5,314
R-squared	0.01	0.02	0.20	0.06	0.07	0.23