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GSE Exposure and Risk-Taking in Uncertain Times

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Concentration in Mortgage Markets: GSE Exposure and Risk-Taking in Uncertain Times*

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Abstract

When home prices threaten to decline, large mortgage investors can benefit from fostering new lending that boosts demand. We ask whether this benefit contributed to the growth in acquisitions of risky mortgages by the government-sponsored enterprises (GSEs) in the first half of 2007. We find that it helps explain the variation of this growth across regions as well as regional house price and credit changes. The growth predicted by this benefit is on top of the acquisition growth caused by the exit of private-label securitizers. Our results are consistent with the GSEs actively targeting their acquisitions to counter home-price declines.

Keywords: GSEs, Concentration, Risk Exposure

JEL Classifications: G01, G21, L25, R31.

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1. Introduction

The GSEs grew their risky acquisitions significantly in those pivotal months at *negative* NPV terms,[1] and grew them much more in some places than others. Fannie and Freddie grew their low-FICO acquisitions by 41% and 50%, respectively, in 2007H1, but in some MSAs the growth was over 100% while others shrank as much as 37%.[2] This growth of risky GSE purchases correlates *negatively* across regions with the exit of the PLs, not positively as it would if the GSEs just passively drifted into the PLs' market share.

Our strategic analysis builds on Gupta (2021), which shows that lenders with enough scale and exposure can gain from pushing out loans when a home-price drop threatens. The extra loans fend off the drop by supporting prices, whether by enabling purchases or by forestalling sales through refinancings, and the higher prices benefit the lenders by reducing defaults among the mortgages they hold.[3] Higher prices do this by raising home equity and thereby discouraging strategic default and easing refinancing, and by increasing liquidation and collateral values if default and foreclosure occur anyhow. This benefit would mean little to a small lender with a sparse portfolio, since the likely effect of a few new mortgages in an area on mortgages in the portfolio would be small. But to a large participant whose holdings are dense in the area, the benefit may be high enough to be a strategic consideration. The GSEs are the largest participants in the US mortgage market, and while they do not originate mortgages, they buy mortgages from those who do and then bear their credit risk by either holding or insuring them. Consequently, their acquisition strategies shape the incentives of originators and they stand to benefit from the effect of expanded originations on their existing loans.[4] Since the GSEs' usual risk boundaries are already well-known to lenders and

[1] See Federal Housing Finance Agency (2009), p. 33

[2] All FICO scores in our analysis are origination FICO scores from the ICE, McDash dataset.

[3] For convenience, we discuss the effect of extra mortgages in terms of demand, though technically the effect of a refinancing mortgage that helps a borrower keep a house she would otherwise have to sell is less supply.

[4] Gete and Reher (2020) provide evidence that higher secondary market prices increase primary mortgage origination activity.

others, expansion would likely come from outside those boundaries, i.e., from high-risk loans.

The first piece of evidence that this price support strategy played a role in the GSEs' risky acquisitions is the timing: the GSEs grew these acquisitions when the benefit from supporting prices was at its highest, i.e., when the likelihood of a price drop was both big enough *and* not *too* big to fight. The theoretical analysis of Gupta (2021) finds the strongest incentive at the transition out of a housing boom, as these are moments when lenders have substantial outstanding exposures from the boom and when the default risk of those large exposures starts to grow. Evidence that the first months of 2007 were such a moment includes both the paths of default swap spreads on asset-backed securities as well as the GSEs' own statements in statutory filings and elsewhere.[5] That the growth occurred at the predicted moment supports the price support explanation, but it is not a well-identified test, so for identification, we turn to the cross sections of both the benefit and the growth.

To identify the price support hypothesis, we exploit the cross sections of the GSEs' regional concentrations and of the elasticity of housing supply (henceforth, just "elasticity"), as measured by Saiz (2010). The GSEs' regional concentrations tell us where they benefit more from price support, and the elasticity of housing supply tells us where the GSEs get more price support per unit of demand support. Elasticity is particularly relevant to managing the end of a boom, considering the larger supply of houses that the boom fosters in higher-elasticity regions, and how much harder this makes it to support their prices when the boom ends. A GSE growing its risky acquisitions to support prices would focus this growth where its concentration is high and the elasticity is low.

The empirical question is thus a double difference: is the growth in a GSE's risky acquisitions in 2007 greater 1) where the GSE is more concentrated, and 2) where elasticity is low? We run this test on the cross section of MSAs while controlling for external regional factors that might influence both the existing concentrations and the subsequent risky acquisitions, and also controlling for passive drift into acquisitions from the regional intensity

[5] See Stanton and Wallace (2010) and Section 2.

of the exit by PLs. The results bear out the price support hypothesis. There was more growth in 2007H1 where the GSEs were more concentrated, and even more so where elasticity was lower. At the point estimate, in an MSA with an elasticity of 1, i.e., the cusp between inelastic and elastic, a 1 percentage point increase in a GSE's outstanding share associates with a 0.9 percentage point increase in the growth of low-FICO mortgages purchased by the GSEs in 2007.

Our baseline identification relies on controls to address endogeneity between concentration and subsequent acquisition growth. In addition, we sharpen the analysis by using the 2006 increase in the conforming limit from $359,540 to $417,000 to obtain quasi-random variation in the GSEs' concentration. The variation across MSAs in house price distributions delivers variation caused by federal policy rather than operating decisions in the proportion of houses newly eligible for GSE loans, so it provides us with quasi-exogenous variation. We regress our key outcome variables on this variable instead of on the GSEs outstanding share and find our main regression results are robust.

The evidence that the GSEs targeted geographically raises the question of how they did so, and in particular how to square the discretion implied by targeting with the GSEs' reputation for (nearly) automated purchases within well-known parameter boundaries. To address this question we focus on the contrast in GSE purchases across the well-known boundary at a 620 FICO score. This boundary divides a region on the right (mortgages with FICO scores above 620) with more automated purchasing from one on the left (mortgages with FICO scores below 620) with more discretionary purchasing.[6] Below 620, the GSEs could exercise greater discretion through the regional standards of high-profile campaigns such as Home Possible (Freddie) and MyCommunityMortgage (Fannie), and also through ad-hoc community outreach.[7] We exploit the jump in discretion below 620 to help identify the role of discretion in the GSEs' risky purchase growth.

[6]See Keys, Mukherjee, Seru, and Vig (2010).

[7]We discuss the GSEs' discretionary acquisition channels in greater detail in Section 2.

We identify with the jump by testing whether the effect of concentration and elasticity on acquisition growth in 2007H1 is higher just below 620 than just above. An added virtue of this test design is that its focus on *within*-MSA differences removes any remaining influence of across-MSA differences. The test finds a significant role for discretionary lending: at the point estimates, assuming an elasticity of 1, the effect on growth in 2007H1 of a one percentage point increase in concentration is over four times as big just below 620 than just above.

The GSEs did not succeed long-term at preventing a financial crisis but did they succeed at least in the short-term at expanding lending and supporting prices? When we replace the dependent variable with regional house price appreciation, mortgage supply and mortgage application denial rates, we find that the former two went up and the latter went down where the GSEs were more concentrated and housing supply was less elastic. So the evidence for the price support hypothesis extends beyond the GSEs to the real economy.

The concentration of the GSEs has long raised concerns about the anti-competitive effects of their government backing. The effect of concentration highlighted by our results is not about competition but rather internalization. Because of their concentration, the GSEs internalize more of the externalities of the marginal home purchase. This internalization may have positive effects in some scenarios, and our results suggest that indeed house price appreciation was higher in 2007 in areas where the GSEs supported housing. However, the increase in high-risk acquisitions can also increase systemic risk. If the GSEs succeed at fending off a decline then ex post the internalization is beneficial, but if they fail then the downturn may be worse.

The rest of this paper is arranged as follows. Section 2 describes literature related to our paper and gives some background on the GSEs' statements around 2007H1, on the general state of the housing market in 2007 and on the GSEs' geographic targeting. Section 3 describes the data. Section 4 describes the main analysis and our results, while Section 5 presents some additional tests. The last section concludes.

2. Related Literature and Background

Related Literature: Many have analyzed aspects of mortgage lending in and around the financial crisis, but few studies focus on the first months of 2007 in particular.[8] Our paper is closest to Bhutta and Keys (2021), who document that issuance of private-mortgage insurance (PMI) surged in the beginning of 2007 and also that this issuance increased disproportionately in the GSE market. They show that PMI issuance grew by nearly 50% in 2007, with a greater increase in the riskiest neighborhoods of cities that the PMI issuers considered high-risk. To explain this surge, Bhutta and Keys (2021) provide evidence of moral hazard that can encourage PMI providers to incur excessive future liabilities in exchange for current premiums. The same moral hazard might apply to GSEs, though it would not vary with concentration and elasticity like the incentive we address.

There is also a literature on the GSEs' size and structure and their potential to affect the mortgage market. This literature primarily highlights the potential downsides to the GSEs' implicit government guarantee. The analysis by Jeske, Krueger, and Mitman (2013) calculates a negative net effect of the guarantee on overall welfare, with a worse incidence on lower-income consumers, and Elenev, Landvoigt, and Van Nieuwerburgh (2016) connect the implicit guarantee to greater financial fragility.[9] Gete and Zecchetto (2018) focus on a different guarantee—the insurance the GSEs provide against mortgage default—and find that it also has large distributional effects, benefiting middle-income homeowners most of all. We complement this literature by highlighting a distortion that can arise from the GSEs' market power.

A growing literature considers how lenders' existing exposures affect their incentives. The theoretical analysis of Bond and Leitner (2015) asks whether a buyer with an inventory

[8]For analyses of mortgage lending around the crisis not focused on the first months of 2007, see, for example, Mian and Sufi (2009), Keys et al. (2010), Purnanandam (2011), Shiller (2014), Griffin and Maturana (2016), Glaeser and Nathanson (2015), Zevelev (2018), Griffin, Kruger, and Maturana (2021), Greenwald and Guren (2021) and DeFusco, Nathanson, and Zwick (2022).

[9]See Acharya, Richardson, Van Nieuwerburgh, and White (2011) for a longer discussion of the role of the GSEs in the housing boom and bust.

that creditors will mark to market, which could be a GSE holding many mortgages, has the incentive to prevent low transaction prices, and Gupta (2021) asks whether a lender with a large portfolio has the incentive to keep the portfolio performing by supporting the market. In Favara and Giannetti (2017) the question is whether a lender holding and servicing a portfolio has less incentive to foreclose where it is more concentrated, due to more spillover from the foreclosure to the portfolio, and their empirical analysis supports this hypothesis. We also address the effect of concentration, not on foreclosure but on origination, where the spillover through moving the market is unlikely to apply to any but the largest players—the GSEs. Our analysis is also in the spirit of the Bongaerts, Mazzola, and Wagner (2021) finding that *low* market share can be self-perpetuating, in that lenders are less likely to approve new mortgages where they have less share due to their greater risk of uncoordinated fire sales, and also that this feedback is strongest when fire sales are more salient.

While the literature does not connect regional exposure to originations, it does find adverse effects of size on originations along other dimensions. Nadauld and Sherlund (2013) show that the five largest broker/dealer banks dominated subprime securitization and argue that the too-big-to-fail doctrine enlarged their appetite for risk, which in turn pushed them to lower their underwriting standards. Similarly, Dell'Ariccia, Igan, and Laeven (2012) argue that the dominance of a few large lenders reduced lending standards by reducing competition. Other work connects lender competition to mortgage interest rates. Scharfstein and Sunderam (2015) find that reduced competition leads to less sensitivity of the rates homeowners pay to the yields on mortgage-backed securities, and Fuster, Lo, and Willen (2016) associate reduced lender competition with higher rates.

Background: In this section, we provide some background on the state of the mortgage market during 2007H1. Three characteristics of the mortgage market play an important role in our analysis. They are 1) the GSEs chose to expand into riskier mortgages in 2007H1, rather than just drifting into them; 2) 2007H1 was a transitional period in the housing market when mortgage default risk escalated significantly, and both market participants and the

GSEs recognized that falling house prices would likely lead to credit losses; and 3) the GSEs' mechanisms for fostering lending were different for borrowers with FICO scores below versus above 620. We summarize here the evidence for these characteristics and provide additional details, including quotes from the GSEs and other market participants, in Appendix B.

In 2007H1, the GSEs expanded their high-risk loan purchases while private-label securitizers (PLs) left the market. This raises the possibility that the GSEs' expansion was not a strategic choice to expand but rather a passive drift while their strategy remained the same. Public statements from GSE executives indicate that the GSEs actively decided to expand risky purchases (see Appendix B). Consistent with the strategic motive, the regions where the GSEs expanded were not random but rather focused on where they were already more concentrated. This is apparent in Figures 1a and 1b which track the GSEs and PLs risky-loan acquisition across time and divide MSAs into those with more versus less GSE concentration. The figures show that while PLs exited in both sets of MSAs, the GSEs expanded only where they were more concentrated.

Market prices and practitioner commentary identify 2007H1 as a period when the risk of home-price declines that would lead to mortgage default grew from small to significant. The evidence in market prices is documented in Stanton and Wallace (2010) and other research that shows the ABX.HE index of Asset-Backed Securities prices entered 2007 near par and then dropped substantially. Statutory filings, other statements by the GSEs and concurrent press commentary collected in Appendix B also demonstrate that the risk that home prices would drop and cause credit losses was perceived to be low around the end of 2006 and was significantly higher by mid-2007.

The mechanisms by which GSEs could foster lending with regionally targeted incentives varied depending on borrowers' credit scores. The role of a 620 FICO as a boundary between qualitatively different underwriting standards has been closely studied (Bubb and Kaufman (2014), Keys et al. (2010)). The GSEs set this FICO cut-off as the line between automated approval above and more manual approval below. The GSEs have targeted borrowers with

FICO scores below 620 through long-running campaigns targeting riskier borrowers, Home Possible at Freddie Mac and MyCommunityMortgage at Fannie Mae. These affordable housing programs moved boundaries for circumstances and regions at the GSEs' discretion and accounted for 10% of acquisitions in 2007.[10] Both the GSEs had automated underwriting systems that implemented changes to standards below the 620 FICO cut-off as soon as they were uploaded. These systems allowed for variation across regions. For example, Fannie Mae's software showed whether a property was in a region qualifying for a program. The GSEs also advertised these programs by marketing them to newly eligible potential home buyers (see the quotes collected in Appendix B).

3. Data and Summary Statistics

We use loan-level data from ICE, McDash (henceforth referred to as McDash). These data have been used widely, including to study the determinants of mortgage default (Elul 2016) and the expansion of credit during the housing boom (Adelino, Schoar, and Severino 2016). These data are provided by the servicers of the loans, and the contributors include the majority of the top servicers. We focus on first mortgages that are originated or outstanding starting from 2005, since coverage of the McDash data was not as extensive prior to that date (particularly for subprime loans), and continuing through 2008.

The McDash data cover about two-thirds of all mortgage originations in these years. We restrict attention to owner-occupied homes and exclude multifamily properties. The McDash data set is divided into a "static" file, with values that do not change over time, and a "dynamic" file. The static data set contains information obtained at the time of the original underwriting, such as the loan amount at origination, house value at the origination date and origination FICO score; the latter is the "FICO score" used throughout the paper. The dynamic file is updated monthly, picking up in particular whether investor type changes between private-label securitized, Fannie Mae, Freddie Mac, portfolio (and FHA). Because of

[10] See Table 3 in the report by the Federal Housing Finance Agency (2009).

the time it takes a loan to go through the securitization pipeline, many mortgages are initially recorded as portfolio loans when they first appear in the data set; therefore, we define the "investor type at origination" to be that reported at six months from loan origination.

In addition, in some of our tests we also use loan-level data from the public Home Mortgage Disclosure Act (HMDA) data set to calculate the share of GSE goals-eligible loans, total number of mortgage originations, mortgage application denial rates, and the share of mortgage originations for private-label, FHA and VA.[11] In addition, we merge in MSA-level elasticity estimates from Saiz (2010). The elasticity estimates vary between 0 and 12, with a higher number indicating a more elastic MSA. We also create a set of controls to capture MSA characteristics, using data from the U.S. Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS) and the Census, as well as the share of low Equifax Risk Score (henceforth Risk Score) consumers in an MSA from the FRBNY Consumer Credit Panel/Equifax Data (henceforth Equifax CCP). Finally, we also use house price indices at the ZIP-code, county and MSA levels from CoreLogic to update the value of existing properties, and also to calculate MSA-level house price appreciation rates. Variable descriptions and the corresponding data sources are provided in Table A.1.

Table 1 summarizes the experience of the average MSA in 2007. While house prices fell on average between 2006 and 2007, there was substantial variation, with some MSAs seeing declines up to about 30% and others seeing increases up to 12%. Figure A.1 is a scatter plot of house price appreciation in 2007 against outstanding GSE share, which shows a strong positive relationship between the two, a correlation consistent with the share causing the appreciation through acquisitions. Table 1 summarizes credit market conditions across MSAs and shows large variation in the growth in mortgage loans originations, high-risk (as measured by loan-to-income) mortgage loans originations, and the change in the denial rate on mortgage loans. While the average MSA experienced a credit contraction across these measures, some MSAs experienced expansions.

[11] We use HMDA to construct the share of mortgage originations for an investor type when possible because it has better coverage than McDash.

Table 1 also contains portfolio-level statistics on GSE high-risk activity. Focusing on low-FICO mortgages, it shows that Fannie Mae (Freddie Mac) increased its acquisitions of low-FICO mortgages by 41% (50%) on average across MSAs, while the PLs decreased theirs by 87%. There is wide variation around these means, presented graphically in Figure 3a, which shows the dispersion across MSAs of the GSEs' growth in low-FICO acquisitions, and Figure 3b, which shows the dispersion of the PLs' retreat (negative growth) in low-FICO acquisitions. The patterns do not tell a purely passive story. In fact, the GSE growth and the PL retreat show a strong negative correlation of -48%, implying that the GSEs expanded their low-FICO acquisitions less, on average, in MSAs in which PLs retreated more from low-FICO mortgages. Figure A.3 shows the growth in the GSEs' and PLs' low-FICO acquisitions over time. While PL acquisitions fall starting in 2006, the GSE acquisitions increase. Figures 1a and 1b show this pattern separately for MSAs in which the GSEs are more concentrated and for MSAs in which the GSEs are less concentrated. While PL activity declines in both groups of MSAs, the GSE acquisitions increase substantially only in the high-concentration group.

Our empirical tests gain their identification from the variation across MSAs of the GSEs' outstanding shares of mortgages. These shares vary substantially across MSAs, as can be seen in Figure 2, which plots the variation of Fannie Mae's and Freddie Mac's share.

4. Empirical Analysis

In this section, we test whether the GSEs targeted their purchases of riskier mortgages in 2007H1 to support their existing portfolios. The tests are divided into five groups. In the first group, we explore the determinants of GSE shares. We use these tests to identify the relevant group of controls for our main analysis and to establish that the GSEs' share responds significantly to the fraction of houses below the conforming loan limit. This second observation allows us to obtain quasi-exogenous variation in the outstanding GSE share due to the 2006 increase in the CLL, which we use in our subsequent tests. In the second group, we consider GSE portfolio-level outcomes. We test whether the GSE acquisitions of

low-FICO loans grew more in MSAs with higher GSE concentration and lower elasticity. In the third group, we explore channels through which the GSEs were able to most effectively expand their high-risk activity. In particular, we use the difference in GSE underwriting requirements above vs. below a FICO of 620 to test for the role of discretion in the GSEs' acquisitions. In the fourth group, we test the hypothesis on MSA-level outcomes. We test whether house prices went up more, mortgage supply and high-risk mortgage supply grew more and the denial rate on mortgage applications increased less in 2007 in MSAs with higher GSE concentration and lower elasticity. Finally, we run robustness checks and address alternative hypotheses.

The regressions control for regional factors that could have influenced the GSEs' acquisitions. Our results present two different sets of controls. In the first set, we control for log population, log per capita income, log housing starts, log unemployment, and the fraction of the sub-prime population in 2006. To control for passive supply drift from PL securitizers, we also control for the private-label share of mortgage originations in 2006. In the second set, we control for changes to the above variables between 2006 and 2007, in addition to controlling for their levels in 2006. This set of controls, which accounts for changes between 2006 and 2007, could be problematic because GSE lending may itself influence these variables, making them bad controls. As such, our main specification focuses on the first group of controls—only controlling for levels. We include both sets of controls for completeness. In all regressions studying outcomes at the GSE-portfolio level, we also control for the other GSEs' share. Finally, we also control for the interaction of the population growth and elasticity, and the vacancy rate, which we describe in more detail below.

In the second set of controls, we also account for demand shocks that might affect the interpretation of the Saiz (2010) elasticity measure. We use the elasticities estimated by Saiz (2010), which date to the same era and which have been used in several other subsequent studies (Chaney, Sraer, and Thesmar, 2012; Loutskina and Strahan, 2015; Adelino et al., 2016; Chakraborty, Goldstein, and MacKinlay, 2018). A consideration in using these estimates,

highlighted by Davidoff (2016), is their potential correlation with unobserved housing demand. In particular, land constraints are key to the estimation, and places like San Francisco and Manhattan are both highly land-constrained and highly desirable for wealthy people to live in. To address this, in the second set of controls, we control for the interaction of housing demand as proxied by population growth with the outstanding GSE share to soak up demand effects that may affect the Saiz (2010) elasticity measures. Note that this is not a perfect control for demand effects as it cannot capture changes in housing demand coming from factors other than population growth, for example, differential house price expectations.

The elasticity measure accounts for important regional determinants of the response of house prices to credit, but it does not account for the state in early 2007 of the slack supply that happened to be available, i.e., the supply overhang. Supply overhang in an otherwise inelastic region could dampen the effect of increased demand, and thereby decrease the GSEs' incentives to increase demand. On the other hand, it could exacerbate downward pressure on house prices, which could increase the GSEs' incentives. So while the net effect is ambiguous, it may help to control for it, which we do by controlling for the vacancy rate, i.e., the share of housing units that are vacant in each MSA, in 2006.

Standard errors in all our regressions are clustered at the MSA level. The regressions are also analytically weighted by the number of loans used to construct the regression sample in each MSA in 2007, because the outcomes are MSA and MSA-GSE level averages rather than individual-/mortgage-level data.

4.1. Determinants of GSE Outstanding Share

We start by exploring the determinants of GSE share with balance tables. Table 2 reports differences between high- and low-GSE-share MSAs in terms of population, housing starts, per capita income, unemployment and the sub-prime population at the end of 2006. We define GSE-share as being "high" in two ways. In the first, we define a high-GSE-share MSA as one where either GSE has a share above 40% (the median of GSE-MSA shares), and in the

other it is one where the combined GSE share is above 65% (the median combined share).

The results associate high-GSE shares with significantly smaller fractions of sub-prime borrowers and housing starts and lower rates of unemployment. We also test whether high-GSE-share MSAs have higher fractions of houses eligible for GSE purchase at, or below, an 80% LTV by testing for differences in the fraction of houses with values below the 2006 CLL divided by 80% and we find a significant difference. MSAs with a higher GSE share of outstanding mortgages (High-GSE-share MSAs) have 3-4% more houses eligible for GSE purchase.

The balance-table variables explain a large fraction of GSE-share variation. When we regress the GSE share on these variables, in Table A.2 we find an R^2 of 47% and coefficients that echo the simple comparisons including the relation of house prices to the CLL.

The evidence that GSE share responds to the CLL means we get a quasi-exogenous shock to GSE share from the 2006 increase in the CLL from $359,650 to $417,000, which was an outcome of federal policy rather than a GSE or homebuyer decision. Several existing studies use the CLL increase for the same reason (e.g., Hurst, Keys, Seru, and Vavra, 2016; Bhutta and Keys, 2021). An important caveat is that changes in the CLL may also have affected borrower demand. For example, GSE-eligible loans typically have lower interest rates. In this case, the houses on which a mortgage became eligible for a GSE loan following the 2006 CLL increase may also have experienced greater borrower demand. As such, while the 2006 CLL change provides another tool that can help support the propping-up hypothesis by shocking the GSE share, it cannot definitively establish causality.

We introduce the CLL-change shock with the variable HIGH SHR SHOCK$_i$ which is 1 if the change to the CLL increases the share of eligible homes in MSA i by more than 10%, and 0 otherwise. In the following sections, alongside presenting our results regressing directly on the GSEs' outstanding share, we also regress our key outcome variables on HIGH SHR SHOCK$_i$ instead of on concentration, and control for pre-shock concentration, i.e. concentration at the start rather than end of 2006, which would still affect incentives.

Repeating the test with thresholds lower than 10% for high share shocks finds similar but smaller effects. Table A.11 uses thresholds of 7.5% and 5%, respectively, and shows weaker but still statistically significant effects. This weakening might reflect non-linearities in the incentives imparted by higher concentration.

4.2. Portfolio-Level Outcomes

The next group of regressions tests changes in the GSEs' regional portfolios to understand whether the price support hypothesis explains regional growth in purchasing high-risk mortgages. Risk is calculated from the origination FICO score, where we take a score below 660 to mean high risk. We use the FICO score instead of LTV since house prices do not mechanically affect scores (robustness tests in Section 4.5. use LTV instead). Since the regression addresses GSE portfolio level outcomes, we can run it at the MSA-GSE level, and thus relate each GSE's growth in high-risk acquisitions to its own share. The McDash data also allow for semi-annual measurement so we use changes between the first half of 2006 and the first half of 2007, i.e. the quantity in 2007H1 minus the quantity in 2006H1, rather than calendar-year changes. The regression model is thus

$$\Delta\text{FICO } 660_{i,g} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}, \quad (1)$$

where $\Delta\text{FICO } 660_{i,g}$ is GSE g's change in log mortgage acquisitions with FICO scores below 660 in MSA i from 2006H1 to 2007H1 and $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i and $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. In these regressions, we also control for the private-label share of mortgage originations in MSA i in 2006 as well as the other GSE's outstanding share of all outstanding mortgage loans in MSA i at the end of 2006.

The hypothesis predicts a positive value for the coefficient β_1 on concentration and a

negative coefficient on the interaction term. The results directly using GSE share are reported in the first four columns of Table 3. The last two columns of Table 3 replace $\text{SHR}_{i,g}$ with HIGH SHR SHOCK$_i$ and additionally control for the pre-shock outstanding share of GSE i.

The regression finds that the GSEs tilted more towards low-FICO mortgages in 2007H1 where they were more exposed, and that low elasticity increases the tilt. Focusing on our main specification (3), unit elasticity (which implies a log elasticity of 0) — i.e., the cusp between inelastic and elastic—associates a 1 percentage point increase in concentration with a 0.9 percentage point increase in the growth of a GSE's purchases of low-FICO mortgages in 2007. Our results are consistent when we use the shock to GSE share rather than the GSEs' outstanding share. The private-label share is negative and significant across all specifications indicating that the GSEs were not expanding low-FICO acquisitions as a passive response to a retreat by private-label securitizers. The negative and significant effect of regional vacancy points to supply overhang dampening the GSEs' incentives to boost demand.

4.3. Discretionary Supply

In this subsection we run regressions focused on the GSEs' discretion to target regional demand. Section 2. motivates using the change across a FICO score of 620, which has discretely more discretion below than above. The empirical question for the regressions is therefore whether the growth predicted by the price support hypothesis, i.e., growth from 2006H1 to 2007H1 in high-concentration, low-elasticity MSAs, was higher just below versus at or above a FICO score of 620. Accordingly, we define FICO 620^- as the number of mortgage loans acquired by a GSE with FICO scores between 610 and 619, and FICO 620^+ as the number of mortgage loans acquired by a GSE with FICO scores between 620 and 629, and test whether the growth is stronger in the former than in the latter. This test brings the added virtue of addressing any concerns that could arise from identifying from the cross section of MSAs. This is because this test adds the *within*-MSA variation of FICO 620^- vs. FICO 620^+ to the identification.

The new variables for these regressions are $\Delta\text{FICO } 620^{+,-}_{i,g,k}$ for the two loan buckets indexed by k (620^- or 620^+), which are defined as the growth between 2006H1 and 2007H1 in bucket k of GSE g's acquisitions in region i. The test statistic is a triple difference that can be hard to interpret, so before adding this 620^- vs. 620^+ third dimension we first run the double difference regression separately on the 620^- and 620^+ subsamples, with the dependent variable in the MSA-portfolio regression model (1) replaced by $\Delta\text{FICO } 620^-$ and $\Delta\text{FICO } 620^+$, respectively. These regressions, in Panel A of Table 4, find the footprint of price support in both the higher- and lower-discretion buckets, as indicated by the interaction coefficients. They also find this footprint in the contrast between the key coefficients that are three to four times bigger in the higher-discretion bucket. So the separate double-differences bear out the prediction of a stronger effect with more discretion.

The triple-difference test joins the two subsamples, regressing $\Delta\text{FICO } 620^{+,-}_{i,g,k}$ on GSE g's outstanding share and elasticity *and* the indicator 620^-_k that is 1 for loans in FICO620^-. The full regression is thus

$$\begin{aligned}\Delta\text{FICO } 620^{+,-}_{i,g,k} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \beta_4 \text{GSE SHR}_{i,g} \times 620^-_k \\ + \beta_5 \text{HPE}_i \times 620^-_k + \beta_6 \text{GSE SHR}_{i,g} \times \text{HPE}_i \times 620^-_k + \beta_7 620^-_k + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g,k}.\end{aligned} \tag{2}$$

The coefficients testing for the effect of concentration on discretionary purchases, and for the effect of concentration combined with low elasticity on discretionary purchases, are $\text{SHR}_{i,g} \times 620^-_k$ and $\text{SHR}_{i,g} \times \text{HPE}_i \times 620^-_k$.[12] The results of the regression are reported in Panel B of Table 4.

The triple difference shows that the effect of discretion within MSAs bears out the strategic price support hypothesis. Both the effect of concentration and the effect of the combination of concentration and low elasticity on GSE high-risk loan growth are significantly stronger among the loans that allow more discretion. At the point estimates, at an elasticity of 1, the

[12]Note that there is no prediction for the effect of low elasticity when it is not combined with concentration, which is what is estimated by $620^- \times \text{HPE}_i$.

effect of a one percentage point increase in a GSE's concentration on its high-risk acquisition growth in 2007H1 is over four times as large below a FICO score of 620 than it is above. The 2006 PL share of mortgage originations continues to be negative and significant, suggesting that controlling for their share, the GSEs were less likely to expand discretionary purchases as a passive response to PL exit.

4.4. MSA-Level Outcomes

The fourth group of regressions explores regional changes in MSA-level outcomes in 2007, beginning with house price appreciation. Figure A.1 shows a positive relation to the combined concentration of the two GSEs, consistent with the hypothesis. We start by testing this relation formally but since the strategy operates at the individual rather than combined GSE level, we relate a region's appreciation to the maximum of the two individual concentrations.[13] The dependent variable in these regressions is HPA_i, the change in the log house price index between 2006 and 2007 in MSA i. The regression model is thus

$$\text{HPA}_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i, \tag{3}$$

where SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ is a vector of controls at the MSA-level. The hypothesis predicts a positive β_1 on concentration and a negative β_3 on the interaction between concentration and elasticity. Results are reported Table 5. The first three columns show the results using the outstanding share directly while the last two use the shock to the GSE share from the change in the 2006 CLL.

The regressions find that house prices appreciated more in 2007 where the GSEs benefited most from price support, i.e., where they were more concentrated and where supply was less elastic, as evidenced by the positive coefficient on concentration and the negative coefficient

[13] Table A.10 shows robustness to using the combined share of both GSEs instead.

on the interaction. For a sense of the magnitudes, focusing on column (3), at unit elasticity, a 1 percentage point increase in concentration is associated with about a 1.3 percentage point increase in house price appreciation. Note that while these results are consistent with the propping-up hypothesis, they do not have a causal interpretation as we cannot rule out the possibility that the GSEs were responding to their house price expectations.

Pushing out mortgages in a region should produce not just higher prices in the region but also better mortgage credit outcomes. To test for this effect we use HMDA data showing the change in mortgage supply (loans originated), the change in high-risk mortgage supply, and the change in the denial rate on mortgage applications. For this test a mortgage is high-risk if the loan-to-income ratio is above 2. This is not the ideal measure because the house price affects the loan amount, but it is the only measure of risk available in the HMDA data from this period. We run the tests by replacing the dependent variable in regression model (3) with the change in log mortgage originations, the change in log high-risk mortgage originations, and the change in the denial rate on mortgage applications respectively between 2006 and 2007.

Tables 6 and 7 contain the results of the regressions explaining mortgage credit supply, which show both total mortgage supply and high-risk mortgage supply growing more in 2007 where the GSEs were more concentrated and particularly in inelastic MSAs. A relatively low elasticity of 1 associates a 1 percentage point increase in concentration with a 1.9 percentage point increase in mortgage-supply growth and a 2.6 percentage point increase in high-risk mortgage-supply growth in 2007. Results for denial rates, shown in Table 8, find the predicted negative coefficient on concentration and positive coefficient on the interaction, which imply that unit elasticity associates a 1 percentage point increase in concentration with a .33 percentage point reduction in the denial rate on mortgage applications in 2007.

4.5. Additional Evidence and Robustness

The empirical tests find the hallmarks of strategic price support in the expansion of the GSEs' risky acquisitions. These are 1) the correlation across MSAs of 2007 high-risk acquisition and concentration at the start of 2007, 2) the greater expansion when high concentration coincides with low elasticity, 3) the greater expansion occurring for loans where the GSEs can exercise greater discretion, and 4) higher house prices and mortgage supply and lower credit denial all following the same pattern. The regressions account for passive drift in the GSEs' acquisitions due to PLs leaving by controlling for the PL share of 2006 originations and the change in this share between 2006 and 2007. This subsection addresses remaining questions with additional variations on the basic regressions that continue to find the hallmarks of strategic price support. We also provide some direct evidence that lending volume responds to geographic targeting by the GSEs.

Loan Modifications: Loan modifications are another way the GSEs can support prices, and the plot of 2007 modifications against concentration in Figure A.2 shows the positive relation consistent with price support. We test for the effect of price support on modifications by replacing the outcome variable in regression model (1) with the change in log modifications by GSE g in MSA i between the first half of 2006 and 2007.[14] The results, reported in Table A.3, show some evidence that the GSEs increased loan modifications significantly more where they were more concentrated, with a greater increase in inelastic MSAs. However, the results are not consistently significant across regression models, with the significant results occurring when we use the shock to GSE share, while the results directly using GSE share are insignificant.

While loan modifications are an interesting outcome to look at, there were generally not a lot of modifications happening in this period. In both the first half of 2006 and 2007, 95% of the MSAs in our sample had less than .001% of loans that were modified. Focusing on

[14]Modifications are constructed in a similar way to that outlined in the Appendix to Adelino, Gerardi, and Willen (2013), and consist of interest rate reductions, term extensions and principal balance changes.

delinquent loans, in both these periods, 75% of the MSAs in our sample had 0% of delinquent GSE loans modified, while 95% of the MSAs in our sample had fewer than 5% of delinquent GSE loans modified. While modifications did increase quite a lot in 2007, they were still a small fraction of GSE activity, even relative to delinquent loans.[15] In general, during the crisis, modifications did not increase substantially until the Home Affordable Modification Program came into effect in 2009. Notably, although our results on loan modifications, when significant, are in line with a price support hypothesis, they are less robust than our other outcome measures.

Saturation in the Prime Market: We addressed one reason for the GSEs to target non-prime mortgages, which is that they have more discretion in the subprime market. Another potential reason is that prime borrowers already have the mortgages they want, i.e. the prime market is saturated. Gupta (2021) hypothesizes that an expansion to risky loans would be necessary to support house prices if the prime market were saturated.

To test whether there were indeed few additional loans to be made to prime borrowers we run two additional tests. First, we test whether areas with high concentration and low elasticity also had relatively high saturation of prime markets. We do this with a regression predicting the number of loans made in 2006H2 to prime borrowers, which we take to be those with FICO scores of at least 660, as a proportion of the population in 2006. The results in Table A.4, show that indeed, in the high-concentration, low-elasticity MSAs the GSEs were already making a relatively large number of prime loans per capita, indicating the difficulty of making even more.

The second test for saturation asks whether prime lending increased by replacing the outcome variable in regression model (1) with the change in log prime acquisitions from 2006H1 to 2007H1. The results in Table A.4 show no significant results among high-FICO loans, consistent with saturation reducing opportunities to push out more loans.

Growth in Loans Held on Portfolio: To further rule out other explanations such

[15]This is also consistent with Adelino et al. (2013), who find that fewer than 1% percent of loans that entered delinquency in 2006 and 2007 were modified in the following year.

as a demand shock that happened to correlate with GSE concentration and elasticity, we also test whether the loans retained by the lenders vary with concentration and elasticity like the loans they sell to the GSEs do. Accordingly, we repeat the portfolio-level regression explaining the increase in high-risk acquisitions, only with the GSEs' purchases replaced by the lenders' retentions. The results, in Table A.5, find that the retained loans do not vary across MSAs like the loans sold to the GSEs, and thus do not support this external demand-shock explanation.

Agency Goals: Congress sets housing goals for the GSEs. The GSEs see little consequence from falling short of these goals (Acharya et al. 2011) but the goals could still influence the GSEs' purchases, including in early 2007. To account for this possibility, Table A.6 adds to the main baseline regression with level controls by controlling for the growth in the fraction of mortgage loans satisfying GSE goals. We use two different measures of goals. In Panel A, the numerator of the fraction is simply the number of loans that count towards a goal. In Panel B, loans are weighted by how many goals they count towards. Our results remain robust across all specifications. Additionally, the coefficients on the change in GSE goals are mostly insignificant, suggesting that the increase in GSE and MSA-level high-risk activity does not correlate with an increase in GSE goal-eligible loans.

FHA and VA Share: Adelino, McCartney, and Schoar (2020) document an increase in FHA and VA lending in 2007.[16] To try and understand how this change affected the GSEs' increase in high-risk lending, we run our main regression specification additionally controlling for the FHA and VA share of loan originations in 2006. The results are reported in Table A.7. There is no significant effect of the FHA and VA share on the GSEs' high-risk acquisitions reported in column (1). As such, we cannot say whether the GSEs adjusted their own strategies in response to expectations about FHA and VA loans. In the MSA-level outcomes, reported in columns (2)-(5), the coefficients on the FHA and VA share are the opposite of those for the PL share. This is in line with the results of Adelino et al. (2020)

[16]The market share of shadow banks hovered around 30% from before the crisis through 2011 when it took off with the rise of fintech origination; see Buchak, Matvos, Piskorski, and Seru (2018).

documenting an increase in FHA and VA lending, in contrast to a PL retreat.

Additional GSE Portfolio-Level Outcomes: An alternative measure of the riskiness of a loan is the LTV ratio. High-LTV is problematic for our purposes since it combines cause and effect through its mechanical relation to house prices, but it is an important measure of risk so we include it for completeness. Results for high-LTV loan acquisitions are in Table A.8, which shows that the conclusion that the GSEs' high-risk acquisitions increased in areas with higher concentration and lower elasticity is robust to this alternative measure.

Purchases versus Refinances: The main regressions combine purchase and refinance loans, but as these loan types plausibly influence prices in distinct ways, they may exhibit different responses. To allow for this possibility, Table A.9 separates purchase and refinance loans before predicting the change in log low-FICO loans, the change in log MSA-level loan supply, and the change in log MSA-level high-risk loan supply. The results in Panel A of Table A.9 show that both purchase and refinance loans generally respond to concentration and its interaction with elasticity. Panel B of Table A.9 tests for a difference with a pooled regression at the MSA-loan purpose (for MSA-level outcomes) or MSA-GSE-loan purpose (for portfolio outcomes) level that tests for differences between the relevant coefficients. Only one tests positive: the effect of high concentration and low elasticity on an MSA's loan supply is stronger for refinance loans than purchase loans. A big push on refinance loans would be consistent with the report in Freddie Mac's 2007 annual report that "Many lenders tightened credit standards...[which] adversely affected many borrowers seeking to refinance out of ARMs scheduled to reset to higher rates, contributing to higher observed delinquencies." It would also be consistent with the high incidence of ARMs coming up for reset (Gupta, 2019). Going into 2007, 12% of all loans were ARMs resetting in the next two years (the analogous figures for loans with origination FICOs below 660 and 620 are 22% and 28%, respectively).[17] So while both types of loans support prices, the popularity of subprime 2/28-type loans in the boom may have figured heavily in the fight against a bust.

[17]These numbers are calculated from the McDash data.

The GSEs' Effect on Lending Standards: To push out loans the GSEs need to both widen eligibility *and* get the word out to lenders and borrowers so that the newly eligible loans actually happen. Section 2. discusses ways to do this that don't necessarily leave a public record. One that does leave a record is a published announcement, and on January 23, 2007, Fannie Mae Announcement 07-01 reported expanded standards for the MyCommunityMortgage program, which targets borrowers with FICO scores below 620, where the expansion was higher income limits in selected regions with high median home prices.[18] We can learn whether this expansion in eligibility expanded high-risk borrowing by tracking mortgage originations in these regions across the announcement and sorting along two dimensions: mortgages purchased by the GSEs versus those retained by lenders, and those in 620^- versus those in 620^+. The GSE purchases, in the top panel of Figure 4, show a significant increase in 2007H1 in 620^- and little change in 620^+, while the retained loans in the bottom panel show little change in both credit-score groups. So riskier lending did increase with the announcement of wider standards, and the GSEs absorbed this increase with their purchases.

5. Conclusion

The GSEs buy a large fraction of the mortgages in the communities they serve, and they also retain the credit risk of most of the mortgages they buy. We ask whether this combination of concentration and risk retention creates an incentive to support housing prices, when a downturn becomes a possibility, by encouraging new purchases that reduce the credit risk of old ones. In particular, we test whether this incentive pushed the GSEs further into riskier products when a downturn threatened in early 2007, and we find that it did. These strategic acquisitions were on top of the passive acquisition growth due to the GSEs' competitors shrinking and leaving.

[18]The regions are the MSAs of Portland-Vancouver-Beaverton, Seattle-Tacoma-Bellevue, Boston-Cambridge-Quincy, New York City-Northern New Jersey- Long Island; New York's Dutchess, Orange, and Ulster Counties; and all of California and Hawaii.

Scrutiny of the crisis highlights the role of risk retention, and the usual question is whether market participants retained too little. For the GSEs, low risk retention has never been an issue, since bearing credit risk is fundamental to their role in the market. Our results raise the question of whether their retention may have been high enough to introduce an incentive that skews their acquisitions. We conclude that this retention-driven incentive amplified the growth of their risky acquisitions in regions that regulators and others can identify in advance, i.e., the regions with particularly high GSE concentration and low home-price elasticity. Regulators might bear this in mind when they actively encourage higher concentration, as in the proposed revision to the Community Reinvestment Act, which rewards additional and potentially riskier lending in the regions where a lender is already more active.

The GSEs entered conservatorship after the 2008 fall of Lehman Brothers, and they are still there. This governmental oversight may further shape the incentive we document. The government's incentive to fight off a downturn through mortgage purchases could be even stronger than the incentives of independent GSEs, since the government internalizes the effects of the purchases through more than just the GSEs' portfolios. Indeed, the GSEs have been increasingly used as an instrument of government policy, offering forbearances and staving off foreclosures during the pandemic. The government, operating through the GSEs, may face stronger incentives to fight off a downturn but may also internalize systemic risk to a greater extent. These issues are important to consider as the future of the GSEs is determined.

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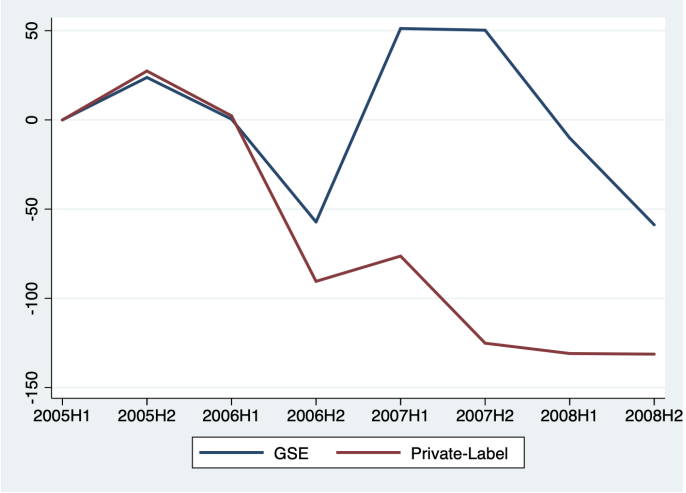
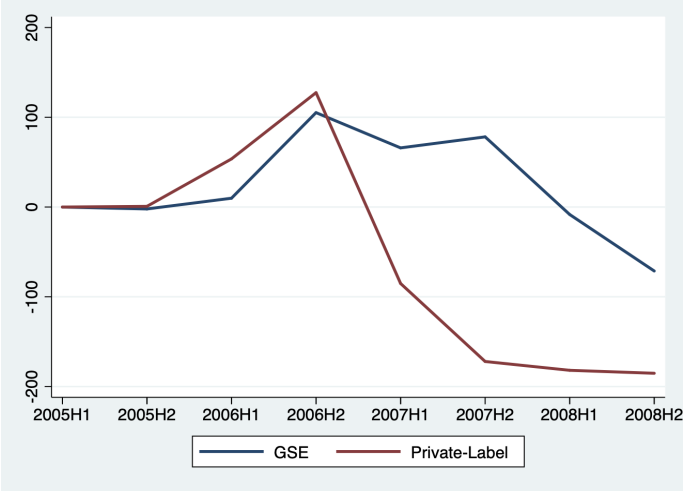
Figures and Tables

Figure 1: Low-FICO Acquisitions: Low Versus High GSE Share



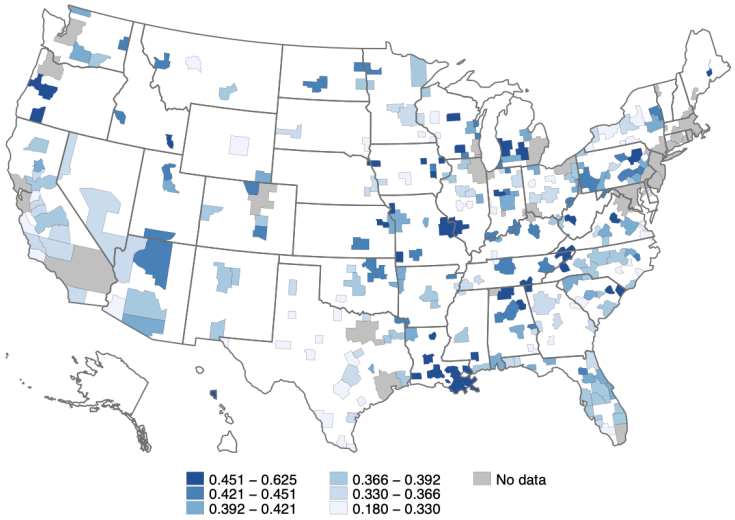
(a) High GSE Share



(b) Low GSE Share

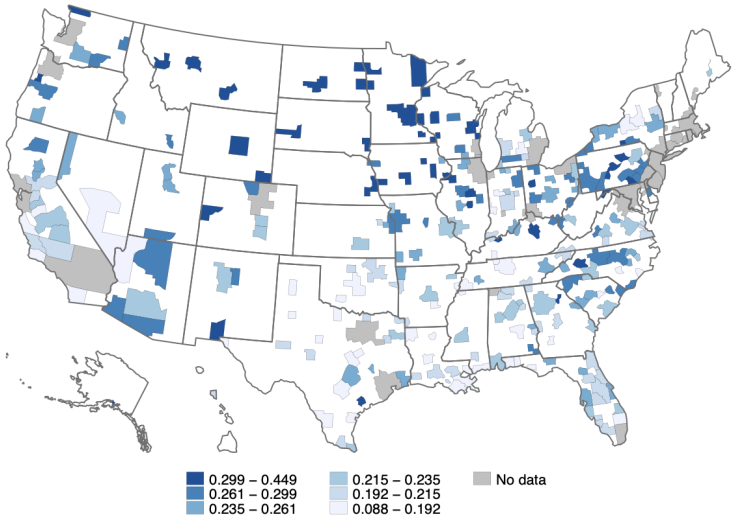
The top (bottom) panel of the figure above plots acquisitions of loans with FICO scores below 660 by the GSEs and PLs, normalized by loan acquisitions in 2005H1 by subtracting 2005H1 acquisitions from total acquisitions at each period, from 2005 to 2008 in MSAs in which the GSEs had a high, i.e., above median (low, i.e., below median), outstanding share at the end of 2006. Y-axis values are in the thousands. Data are semi-annual. Data source: McDash.

Figure 2: Variation in GSE Outstanding Shares across MSAs



(a) Variation in Fannie Mae's Outstanding Share

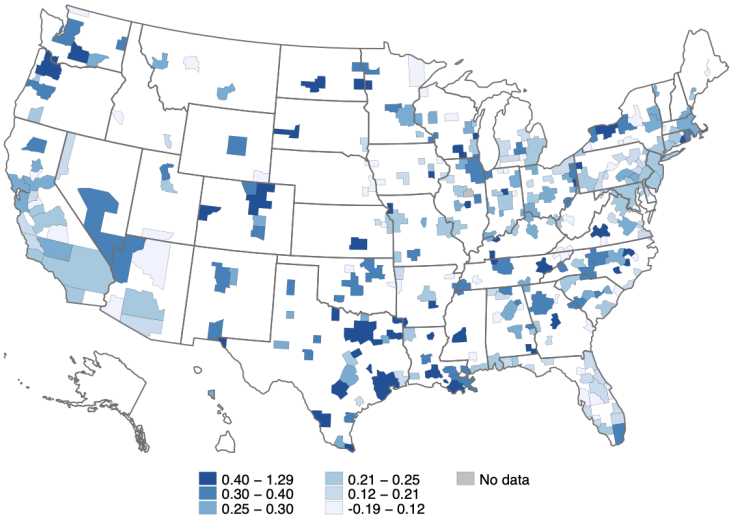
The map shows the variation in Fannie Mae's outstanding share of mortgages across MSAs at the end of 2006. Data source: McDash.



(b) Variation in Freddie Mac's Outstanding Share

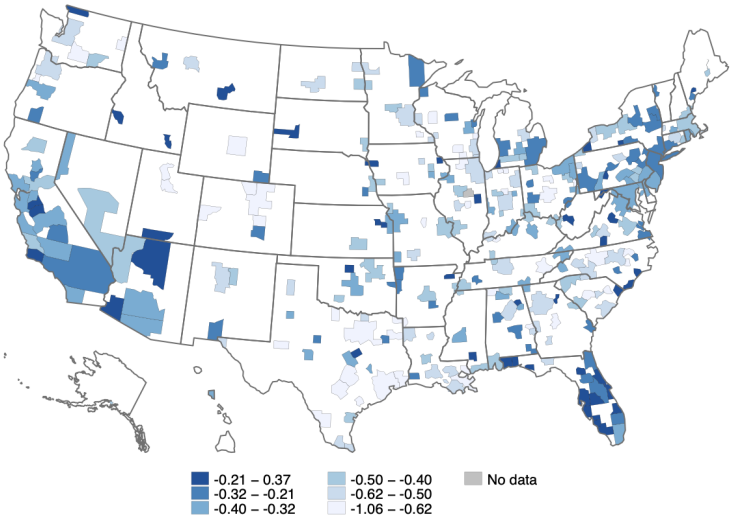
The map shows the variation in Freddie Mac's outstanding share of mortgages across MSAs at the end of 2006. Data source: McDash.

Figure 3: Variation in Low-FICO Mortgages across MSAs



(a) Variation in the GSEs' Low-FICO Growth

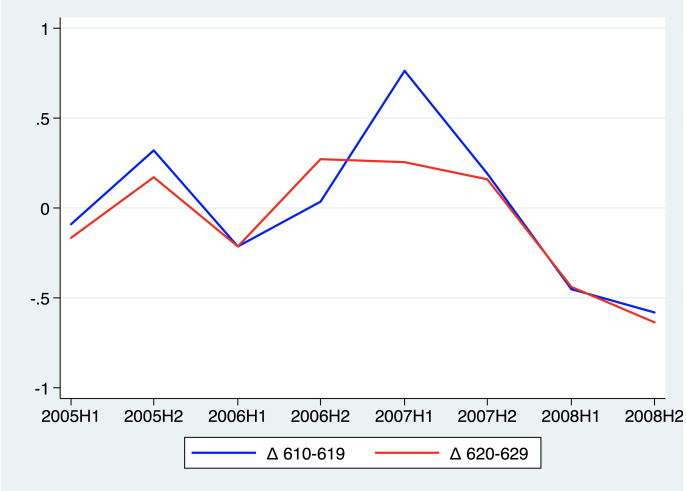
The map shows the variation in the change in log mortgages with FICO scores below 660 acquired by the GSEs between the first half of 2006 and 2007. Data source: McDash.



(b) Variation in PLs' Low-FICO Retreat

The map shows the variation in the negative change (i.e., contraction) in log mortgages with FICO scores below 660 acquired by private-label securitizers between the first half of 2006 and 2007. Data source: McDash.

Figure 4: Relaxation of Community Lending Standards in 2007H1



(a) Fannie Mae Acquisitions

(b) Loans Held on Portfolio by Lenders

The figures above plot loans with FICO scores between 610-619 and between 620-629 in MSAs in which community lending standards were relaxed in 2007 that were acquired by Fannie Mae (top panel) and that were held on portfolio by lenders (bottom panel). Data source: McDash.

Table 1: Summary Statistics

	MSA-Level Outcomes				
	N	Mean	Std Dev	Min	Max
Δ HPA	257	-0.02	0.07	-0.31	0.12
Δ Supply	261	-0.24	0.14	-0.72	0.02
Δ HIGH-LTI	261	-0.17	0.16	-0.71	0.27
Δ Denial Rate	261	0.02	0.03	-0.04	0.12
	Fannie Mae				
	N	Mean	Std Dev	Min	Max
Δ FICO 660	277	0.41	0.23	-0.37	1.06
Δ High-LTV	277	1.04	1.37	-0.26	18.00
Δ Low-FICO Share	277	0.03	0.04	-0.10	0.19
Δ High-LTV Share	277	0.07	0.05	-0.10	0.22
Δ MOD	277	0.42	0.09	0.22	0.73
	Freddie Mac				
	N	Mean	Std Dev	Min	Max
Δ FICO 660	277	0.50	0.26	-0.33	1.37
Δ High-LTV	276	0.93	0.92	-0.24	12.00
Δ Low-FICO Share	277	0.05	0.04	-0.14	0.23
Δ High-LTV Share	277	0.07	0.06	-0.09	0.27
Δ MOD	277	0.32	0.08	0.12	0.78
	Private-Label				
	N	Mean	Std Dev	Min	Max
Δ FICO 660	277	-0.87	0.25	-1.82	0.18
Δ High-LTV	277	-0.47	0.15	-0.85	0.37
Δ Low-FICO Share	277	-0.05	0.08	-0.30	0.18
Δ High-LTV Share	277	0.02	0.07	-0.26	0.25

The table reports summary statistics of changes in mortgage activity both at the portfolio-level and MSA-level between 2006 and 2007. Detailed variable descriptions are in Table A.1.

Table 2: Differences in MSAs with High and Low GSE Share

(a) High Single GSE Share

	LOW GSE SHR			HIGH GSE SHR			
	N	MEAN	STD	N	MEAN	STD	DIFF
POP RISKSCORE<660	282	0.41	0.09	272	0.35	0.08	-0.055***
POP	250	642,432	891,980	258	612,796	1,139,030	-29,636
STARTS	248	5,329	9,448	258	3,244	5,259	-2,085**
INCOME	250	33,389	6,022	258	33,996	4,960	607
UNEMPLOYMENT	248	0.05	0.02	254	0.05	0.01	-0.005**
HOUSES < CLL	282	0.93	0.14	268	0.96	0.06	0.032**

(b) High Combined GSE Share

	LOW GSE SHR			HIGH GSE SHR			
	N	MEAN	STD	N	MEAN	STD	DIFF
POP RISKSCORE<660	274	0.42	0.08	280	0.34	0.07	-0.076***
POP	242	731,068	1,180,032	266	533,048	849,187	-198,019
STARTS	240	5,857	10,304	266	2,830	3,463	-3,026***
INCOME	242	33,157	6,067	266	34,188	4,912	1,031
UNEMPLOYMENT	240	0.05	0.02	262	0.05	0.01	-0.005**
HOUSES < CLL	274	0.92	0.14	276	0.96	0.06	0.039***

The table reports averages across MSAs of population, housing starts, per capita income, unemployment rate, the share of the sub-prime population, and the proportion of houses with prices less than the $CLL/.8$. In Panel (a), HIGH GSE SHR (LOW GSE SHR) includes MSAs in which either Fannie Mae or Freddie Mac have a share of all outstanding mortgage loans of above (below) 40%. In Panel (b), HIGH GSE SHR (LOW GSE SHR) includes MSAs in which Fannie Mae and Freddie Mac have a combined share of all outstanding mortgage loans of above (below) 65%. Detailed variable descriptions are in Table A.1. ***, **, and * indicate significance at the 1%, 5%, and 10% level.

Table 3: Growth in GSE Low-FICO Acquisitions

	Δ FICO 660					
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	-0.194*	0.541*	0.874*	0.297		
	(-1.73)	(1.66)	(1.75)	(0.61)		
GSE SHR × HPE		-0.830***	-1.117***	-0.864***		
		(-2.97)	(-3.42)	(-2.77)		
SHR SHOCK					0.326**	0.352**
					(2.34)	(2.13)
SHR SHOCK × HPE					-0.335***	-0.350**
					(-2.66)	(-2.24)
HPE		0.433***	0.401***	0.325***	0.028	0.026
		(5.20)	(3.18)	(2.92)	(0.39)	(0.54)
PL SHR			-4.456***	-5.688**	-4.403***	-6.981**
			(-4.38)	(-2.18)	(-4.43)	(-2.55)
OTHER GSE SHR			-0.031	-0.122		
			(-0.10)	(-0.47)		
VACANCY RATE			-1.014**	-0.791**	-1.014**	-0.802**
			(-2.45)	(-2.09)	(-2.51)	(-2.18)
CONTROLS LEVELS	NO	NO	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	YES
R2	0.01	0.12	0.25	0.37	0.21	0.33
N	468	468	418	418	418	418

Columns (1)-(4) of the table report the estimated coefficients of the following regression:

$$\Delta\text{FICO } 660_{i,g} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

Columns (5)-(6) of the table report the estimated coefficients of the following regression:

$$\Delta\text{FICO } 660_{i,g} = \alpha + \beta_1 \text{SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

ΔFICO $660_{i,g}$ is GSE g's change in log mortgage acquisitions with FICO scores below 660 in MSA i between 2006 and 2007. GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. SHR SHOCK_i is a dummy variable that takes a value of 1 if a high proportion of houses (above 10%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table 4: Discretionary Supply (Panel A)

	Δ FICO 620^+				Δ FICO 620^-			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GSE SHR	-0.071	1.543**	1.509	0.091	0.345	3.914***	5.886***	3.873*
	(-0.28)	(2.54)	(1.12)	(0.06)	(0.76)	(4.29)	(3.13)	(1.83)
GSE SHR × HPE		-1.812***	-2.233**	-1.520		-4.050***	-5.945***	-5.025***
		(-2.94)	(-2.41)	(-1.57)		(-4.35)	(-4.32)	(-3.77)
HPE		0.874***	0.736*	0.422		2.061***	2.043***	1.645***
		(4.02)	(1.95)	(1.09)		(6.36)	(4.21)	(3.32)
PL SHR			-5.953**	-17.899**			-14.980***	-26.502**
			(-2.32)	(-2.39)			(-3.55)	(-2.33)
OTHER GSE SHR			-0.580	-0.871			-0.322	-0.521
			(-0.82)	(-1.44)			(-0.25)	(-0.40)
VACANCY RATE			-1.686*	-1.117			-1.353	-0.754
			(-1.76)	(-1.28)			(-0.95)	(-0.50)
CONTROLS LEVELS	NO	NO	YES	YES	NO	NO	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	NO	NO	YES
R2	0.00	0.05	0.08	0.15	0.00	0.12	0.11	0.14
N	463	463	415	415	442	442	393	393

The table reports the estimated coefficients of the following regression:

$$Y_{i,g} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

$Y_{i,g}$ is the growth in GSE g's mortgage acquisitions with FICO scores just above 620 (columns 1-4) and just below 620 (columns 5-8) in MSA i from 2006 to 2007. GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table 4: Discretionary Supply (Panel B)

	Δ FICO $620^{+,-}$			
	(1)	(2)	(3)	(4)
620^{-} × GSE SHR	0.416	2.371**	4.507**	4.497**
	(0.98)	(2.14)	(2.39)	(2.38)
620^{-} × GSE SHR × HPE		-2.238**	-4.019**	-4.008**
		(-2.01)	(-2.45)	(-2.44)
GSE SHR	-0.071	1.543**	1.446	-0.249
	(-0.28)	(2.54)	(1.09)	(-0.18)
HPE		0.874***	0.591	0.242
		(4.02)	(1.53)	(0.65)
GSE SHR × HPE		-1.812***	-2.082**	-1.285
		(-2.94)	(-2.23)	(-1.38)
620^{-}	-0.092	-1.159***	-1.621**	-1.617**
	(-0.58)	(-2.96)	(-2.45)	(-2.43)
620^{-} × HPE		1.187***	1.601***	1.597***
		(2.94)	(2.70)	(2.68)
PL SHR			-10.460***	-22.208***
			(-3.70)	(-3.16)
OTHER GSE SHR			-0.453	-0.704
			(-0.56)	(-0.95)
VACANCY RATE			-1.520	-0.935
			(-1.52)	(-0.97)
CONTROLS LEVELS	NO	NO	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES
R2	0.00	0.10	0.10	0.14
N	905	905	808	808

The table reports the estimated coefficients of the following regression:

$$\Delta\text{FICO } 620^{+,-}_{i,g,k} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \beta_4 \text{GSE SHR}_{i,g} \times 620^{-}_{k} + \beta_5 \text{HPE}_i \times 620^{-}_{k}$$

$$+ \beta_6 \text{GSE SHR}_{i,g} \times \text{HPE}_i \times 620^{-}_{k} + \beta_7 620^{-}_{k} + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g,k}$$

$\Delta\text{FICO } 620^{+,-}_{i,g,k}$ is the growth in GSE g's mortgage acquisitions in FICO bucket k in MSA i between 2006 and 2007. GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table 5: House Prices

	HPA					
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	0.437***	1.333***	1.275***	0.997***		
	(2.91)	(2.61)	(2.87)	(2.61)		
GSE SHR × HPE		-0.867**	-0.913***	-0.739**		
		(-2.32)	(-2.80)	(-2.58)		
SHR SHOCK					0.122**	0.105
					(2.06)	(1.49)
SHR SHOCK × HPE					-0.226***	-0.203**
					(-2.92)	(-2.38)
HPE		0.436***	0.377***	0.323***	0.014	0.019
		(2.96)	(2.75)	(2.76)	(0.64)	(1.03)
PL SHR			-2.483***	-1.248	-2.554***	-2.274**
			(-4.99)	(-1.36)	(-5.45)	(-1.97)
VACANCY RATE			-0.611***	-0.491***	-0.576***	-0.427***
			(-4.47)	(-3.10)	(-3.98)	(-2.74)
CONTROLS LEVELS	NO	NO	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	YES
R2	0.07	0.29	0.59	0.68	0.59	0.69
N	217	217	209	209	209	209

Columns (1)-(4) of the table report the estimated coefficients of the following regression:

$$\text{HPA}_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

Columns (5)-(6) of the table report the estimated coefficients of the following regression:

$$\text{HPA}_i = \alpha + \beta_1 \text{SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

HPA_i is change in the log house price index in MSA i between December 2006 and December 2007. GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. SHR SHOCK_i is a dummy variable that takes a value of 1 if a high proportion of houses (above 10%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table 6: MSA Mortgage Supply

	Δ MSA SUPPLY					
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	1.137***	1.832**	1.883***	1.223**		
	(5.09)	(2.06)	(3.07)	(2.35)		
GSE SHR × HPE		-0.762	-1.106**	-0.816**		
		(-1.17)	(-2.51)	(-2.07)		
SHR SHOCK					0.370***	0.414***
					(4.25)	(4.08)
SHR SHOCK × HPE					-0.455***	-0.495***
					(-4.14)	(-3.98)
HPE		0.471*	0.472**	0.402**	0.037	0.067**
		(1.79)	(2.52)	(2.50)	(1.20)	(2.16)
PL SHR			-4.684***	-2.450	-5.282***	-5.766***
			(-7.17)	(-1.24)	(-8.44)	(-2.90)
VACANCY RATE			-0.892***	-0.580**	-0.844***	-0.499**
			(-4.02)	(-2.37)	(-3.82)	(-2.41)
CONTROLS LEVELS	NO	NO	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	YES
R2	0.14	0.32	0.69	0.76	0.70	0.78
N	222	222	209	209	209	209

Columns (1)-(4) of the table report the estimated coefficients of the following regression:

$$\Delta\text{MSA SUPPLY}_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

Columns (5)-(6) of the table report the estimated coefficients of the following regression:

$$\Delta\text{MSA SUPPLY}_i = \alpha + \beta_1 \text{SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

ΔMSA SUPPLY$_i$ is the change in log mortgage originations in MSA i between 2006 and 2007. GSE SHR$_i$ is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. SHR SHOCK$_i$ is a dummy variable that takes a value of 1 if a high proportion of houses (above 10%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE$_i$ is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X}'_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table 7: High-LTI MSA Mortgage Supply

	Δ HIGH-LTI MSA SUPPLY					
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	1.157***	2.510**	2.616***	1.627**		
	(4.01)	(2.51)	(3.32)	(2.43)		
GSE SHR × HPE		-1.371*	-1.669***	-1.074**		
		(-1.85)	(-2.89)	(-2.07)		
SHR SHOCK					0.395***	0.416***
					(3.39)	(3.12)
SHR SHOCK × HPE					-0.513***	-0.524***
					(-3.53)	(-3.23)
HPE		0.743**	0.702***	0.506**	0.042	0.065*
		(2.54)	(2.98)	(2.46)	(1.01)	(1.67)
PL SHR			-5.176***	-3.038	-5.869***	-6.562***
			(-5.98)	(-1.38)	(-6.89)	(-2.73)
VACANCY RATE			-1.412***	-0.983***	-1.341***	-0.875***
			(-4.63)	(-2.93)	(-4.38)	(-2.93)
CONTROLS LEVELS	NO	NO	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	YES
R2	0.11	0.30	0.62	0.72	0.62	0.74
N	222	222	209	209	209	209

Columns (1)-(4) of the table report the estimated coefficients of the following regression:

$$\Delta\text{HIGH-LTI MSA SUPPLY}_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

Columns (5)-(6) of the table report the estimated coefficients of the following regression:

$$\Delta\text{HIGH-LTI MSA SUPPLY}_i = \alpha + \beta_1 \text{SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

ΔHIGH-LTI MSA SUPPLY$_i$ is the change in log mortgage originations of loans with high loan-to-income ratio in MSA i between 2006 and 2007. GSE SHR$_i$ is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. SHR SHOCK$_i$ is a dummy variable that takes a value of 1 if a high proportion of houses (above 10%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE$_i$ is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table 8: Denial Rate

	Δ DENIAL RATE					
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	-0.256***	-0.335**	-0.328***	-0.218**		
	(-5.46)	(-2.04)	(-3.03)	(-2.03)		
GSE SHR × HPE		0.109	0.184**	0.138*		
		(0.91)	(2.41)	(1.66)		
SHR SHOCK					-0.058***	-0.078***
					(-3.68)	(-3.67)
SHR SHOCK × HPE					0.084***	0.104***
					(4.23)	(4.00)
HPE		-0.089*	-0.101***	-0.087**	-0.029***	-0.030***
		(-1.87)	(-3.34)	(-2.52)	(-5.15)	(-4.59)
PL SHR			0.762***	0.811*	0.824***	1.371***
			(5.58)	(1.75)	(6.56)	(2.93)
VACANCY RATE			0.178***	0.138***	0.169***	0.125***
			(3.92)	(2.68)	(3.79)	(2.74)
CONTROLS LEVELS	NO	NO	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	YES
R2	0.14	0.38	0.71	0.75	0.72	0.77
N	222	222	209	209	209	209

Columns (1)-(4) of the table report the estimated coefficients of the following regression:

$$\Delta\text{DENIAL RATE}_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

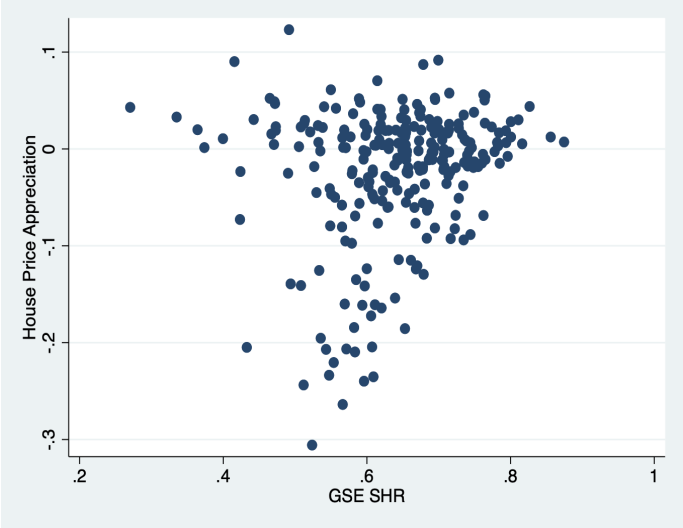
Columns (5)-(6) of the table report the estimated coefficients of the following regression:

$$\Delta\text{DENIAL RATE}_i = \alpha + \beta_1 \text{SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

ΔDENIAL RATE$_i$ is the change in the denial rate of mortgage applications in MSA i between 2006 and 2007. GSE SHR$_i$ is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. SHR SHOCK$_i$ is a dummy variable that takes a value of 1 if a high proportion of houses (above 10%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE$_i$ is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

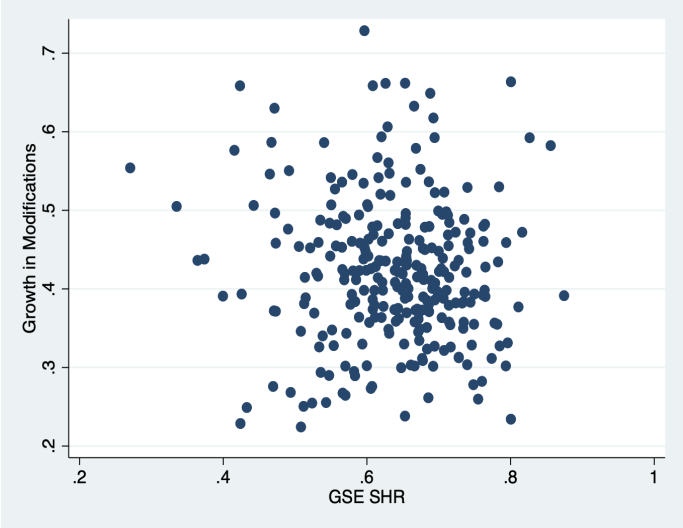
Appendix A

Figure A.1: House Price Appreciation and GSE Share



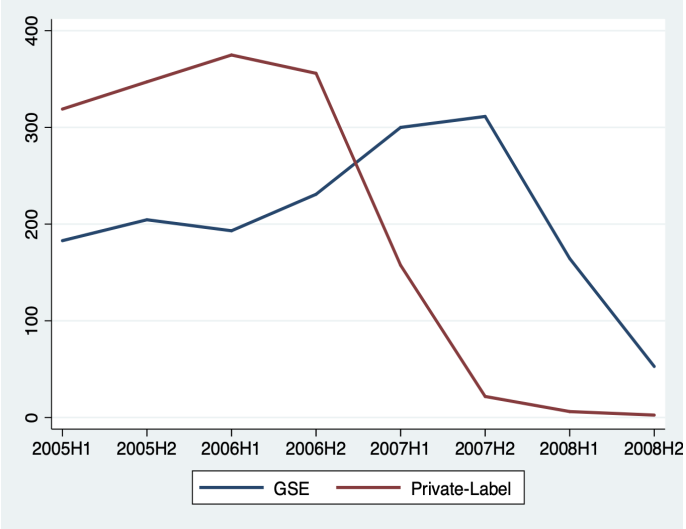
The figure plots the log change in the CoreLogic house price index at the MSA-level from December 2006 to December 2007 against GSE share. Data source: CoreLogic and McDash.

Figure A.2: Loan Modifications and GSE Share



The figure plots the log change in modifications at the MSA-level between the first half of 2006 and 2007. Data source: McDash.

Figure A.3: Low-FICO Acquisitions



The figure plots acquisitions of loans with FICO scores below 660 by the GSEs and private-label securitizers from 2005 to 2008. Y-axis values are in the thousands. Data are semi-annual. Data source: McDash.

Table A.1: Variable Descriptions

Variable Name	Data source	Description
GSE $SHR_{i,g}$	McDash	GSE g's share of all outstanding mortgages in MSA i at the end of 2006
GSE SHR_i	McDash	Higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgages in MSA i at the end of 2006
Δ FICO $660_{i,g}$	McDash	Change in GSE g's log acquisitions of mortgages with FICO below 660 in MSA i between the first half of 2006 and 2007
Δ FICO $620^{+,-}_{i,g,k}$	McDash	Growth in GSE g's acquisitions for each region i in loan bucket k (620^- or 620^+) between the first half of 2006 and 2007
OTHER GSE $SHR_{i,g}$	McDash	Other GSE's share of all outstanding mortgages in MSA i at the end of 2006
HPE_i	Saiz (2010)	Log(1+Housing supply elasticity) in MSA i
HPA_i	CoreLogic	Change in the log house price index in MSA i between December 2006 and 2007
Δ MSA $SUPPLY_i$	HMDA	Change in log mortgage originations in MSA i between 2006 and 2007
Δ HIGH-LTI_i	HMDA	Change in log mortgage originations with high loan-to-income (>2) in MSA i between 2006 and 2007
Δ DENIAL $RATE_i$	HMDA	Change in the denial rate of mortgage applications in MSA i between 2006 and 2007
HIGH SHR $SHOCK_i$	McDash, CoreLogic	Dummy variable that takes the value 1 if a high proportion of properties (above 10%) became eligible for GSE acquisitions following CLL change in 2006
HIGH PRE SHOCK SHR_i	McDash	Dummy variable that takes a value of 1 if either Fannie Mae's or Freddie Mac's share in MSA i was high (above 40%) at the start of 2006 before the CLL change
PRI SHR_i	HMDA	PLs' share of originations in MSA i in 2006
VACANCY $RATE_i$	ACS	Share of housing units in MSA i that are vacant in 2006
CONTROLS LEVEL		
HOUSES<CLL_i	McDash CoreLogic	Fraction of houses in MSA i with updated value less than or equal to CLL/.80 in January 2006
POP_i	BEA	Log(Population) in MSA i in 2006
$STARTS_i$	Census	Log(Housing Starts) in MSA i in 2006
$INCOME_i$	BEA	Log(Per capita income) in MSA i in 2006
$UNEMPLOYMENT_i$	BLS	Log(Unemployed) in MSA i in 2006
POP RISKSCORE< 660_i	Equifax CCP	Share of consumers in MSA i with Risk Score below 660 in 2006
CONTROLS CHANGES		
Δ PRI SHR_i	HMDA	Change in PLs' share of originations in MSA i in between 2006 and 2007
Δ POP_i	BEA	Change in log population of MSA i between 2006 and 2007
Δ $STARTS_i$	Census	Change in log housing starts in MSA i between 2006 and 2007
Δ INC_i	BEA	Change in log per capita income of MSA i between 2006 and 2007
Δ UNE_i	BLS	Change in log number of unemployed in MSA i between 2006 and 2007
Δ LOW-$RISKSCORE_i$	Equifax CCP	Change in consumer share with Risk Score below 660 in MSA i between 2006 and 2007

Table A.1: Variable Descriptions (Continued)

Variable Name	Data source	Description
Additional Variables		
Δ MOD$_{i,g}$	McDash	Change in log loan modifications held by GSE g in MSA i between the first half of 2006 and 2007
Δ HIGH-FICO $_{i,g}$	McDash	Change in GSE g's log acquisitions of mortgages with FICO scores above 660 in MSA i between the first half of 2006 and 2007
HIGH-FICO/POP$_{i,g}$	McDash, BEA	Proportion of high-FICO mortgages acquired by GSE g relative to the population in MSA i in the second half of 2006
Δ HIGH-LTV$_{i,g}$	McDash	Change in GSE g's log acquisitions of mortgages with LTV above 80 in MSA i between the first half of 2006 and 2007
Δ HIGH-LTV SHARE $_{i,g}$	McDash	Change in GSE g's share of acquisitions with LTV above 80 in MSA i between the first half of 2006 and 2007
PORT SHR$_i$	McDash	Share of all outstanding mortgages held on portfolio in MSA i at the end of 2006
FHA VA SHR$_i$	HMDA	FHA and VA share of originations in MSA i identified using Ginnie Mae acquisitions in 2006
Δ GOALS$_{i,g}$	HMDA	Change in fraction of mortgages acquired eligible towards GSE g's goals in MSA i between 2006 and 2007
Δ COMBINED GOALS$_i$	HMDA	Change in fraction of mortgages acquired by the GSEs that are eligible towards their goals in MSA i, between 2006 and 2007
Δ ADJ GOALS$_{i,g}$	HMDA	Change in the number of GSE goals satisfied per each mortgage acquired by GSE g in MSA i between 2006 and 2007
Δ COMBINED ADJ GOALS$_i$	HMDA	Change in the number of GSE goals satisfied per each mortgage acquired by the GSEs in MSA i between 2006 and 2007

Table A.2: Determinants of GSE Share

	GSE SHR		
	(1)	(2)	(3)
HOUSES < CLL	0.154***	0.149***	0.307***
	(2.61)	(2.81)	(4.97)
POP	0.000	0.000	0.000
	(0.20)	(1.01)	(0.38)
STARTS	-0.000	-0.000	-0.000
	(-0.59)	(-1.54)	(-1.12)
INCOME	-0.000	0.000	-0.000
	(-0.29)	(0.31)	(-0.55)
POP FICO<660	-0.355***	-0.270***	-0.710***
	(-6.46)	(-5.45)	(-12.29)
UNEMPLOYMENT	-0.249	-0.285	-0.499*
	(-0.90)	(-1.14)	(-1.70)
CONSTANT	0.335***	0.365***	0.669***
	(3.70)	(4.47)	(7.03)
R2	0.11	0.18	0.47
N	498	249	249

The table reports the estimated coefficients of the following regression:

$$\text{SHR}_L = \alpha + \vec{X}_i\gamma + \epsilon_L$$

In column (1), $L = \{i, g\}$ and in columns (2) and (3), $L = \{i\}$. In column (1), $SHR_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. In column (2), SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. In column (3), SHR_i is Fannie Mae's and Freddie Mac's combined share of all outstanding mortgage loans in MSA i at the end of 2006. $\vec{X}_i$ is a vector of controls at the MSA level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.3: Growth in GSE Loan Modifications

	Δ MOD					
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	0.173***	-0.049	-0.105	0.085		
	(3.62)	(-0.30)	(-0.43)	(0.29)		
GSE SHR × HPE		0.232	0.121	0.123		
		(1.59)	(0.63)	(0.60)		
SHR SHOCK					0.082***	0.078
					(3.53)	(1.58)
SHR SHOCK × HPE					-0.099***	-0.093*
					(-4.16)	(-1.84)
HPE		-0.004	-0.041	-0.045	0.004	0.007
		(-0.10)	(-0.58)	(-0.61)	(0.19)	(0.35)
PL SHR			-1.918***	-1.956**	-1.619***	-1.442
			(-4.83)	(-2.16)	(-4.60)	(-1.34)
OTHER GSE SHR			-0.252***	-0.260***		
			(-3.06)	(-3.80)		
VACANCY RATE			0.056	0.090	0.082	0.122
			(0.55)	(0.84)	(0.82)	(1.10)
CONTROLS LEVELS	NO	NO	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	YES
R2	0.05	0.17	0.23	0.29	0.15	0.18
N	468	468	418	418	418	418

Columns (1)-(4) of the table report the estimated coefficients of the following regression:

$$\Delta\text{MOD} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

Columns (5)-(6) of the table report the estimated coefficients of the following regression:

$$\Delta\text{MOD} = \alpha + \beta_1 \text{SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

ΔMOD is GSE g's change in log loan modifications in MSA i between 2006 and 2007. GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. SHR SHOCK_i is a dummy variable that takes a value of 1 if a high proportion of houses (above 10%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.4: Saturation in Prime Market

	HIGH-FICO/POP				Δ HIGH-FICO			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GSE SHR	0.005***	0.007***	0.008***	0.006**	0.076	-0.202	-0.079	-0.031
	(10.97)	(4.84)	(3.86)	(2.53)	(0.46)	(-0.44)	(-0.11)	(-0.04)
GSE SHR × HPE		-0.002	-0.003**	-0.003*		0.361	-0.185	-0.140
		(-1.51)	(-2.13)	(-1.95)		(0.93)	(-0.37)	(-0.30)
HPE		-0.000	0.000	0.000		-0.226*	0.049	0.066
		(-0.26)	(0.48)	(0.30)		(-1.71)	(0.28)	(0.40)
PL SHR			0.006	0.004			-0.735	1.438
			(0.64)	(0.19)			(-0.79)	(0.60)
OTHER GSE SHR			-0.001	-0.001			-0.450**	-0.402**
			(-0.91)	(-0.74)			(-2.38)	(-2.24)
VACANCY RATE			-0.006***	-0.005***			-0.290	0.054
			(-3.14)	(-2.60)			(-1.11)	(0.25)
CONTROLS LEVELS	NO	NO	YES	YES	NO	NO	YES	YES
CONTROLS CHANGES	NO	NO	NO	YES	NO	NO	NO	YES
R2	0.13	0.16	0.40	0.42	0.00	0.08	0.20	0.28
N	434	434	418	418	468	468	418	418

The table reports the estimated coefficients of the following regression:

$$Y_{i,g} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

$Y_{i,g}$ is GSE g's fraction of acquisitions of loans with FICO scores above 660 relative to the population in the MSA in 2006 (columns 1-4) and change in log acquisitions of loans with FICO scores above 660 (columns 5-8) between 2006 and 2007 in MSA i. GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.5: Growth in Loans Held on Portfolio by Lenders

	Δ FICO 660							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PORT SHR	-1.397	-0.312	-0.539	-0.447	-1.126	0.052	-1.861	-1.278
	(-1.32)	(-0.29)	(-0.55)	(-0.51)	(-1.04)	(0.05)	(-1.04)	(-0.74)
PORT SHR × HPE	1.642**	1.018	1.008	1.155*	1.356*	0.495	1.867	1.742
	(2.21)	(1.23)	(1.48)	(1.77)	(1.81)	(0.58)	(1.49)	(1.54)
HPE	-0.642**	-0.432	-0.628	-0.763*	-0.528*	-0.217	-0.470	-0.418
	(-2.42)	(-1.33)	(-1.56)	(-1.90)	(-1.97)	(-0.65)	(-1.64)	(-1.65)
PL SHR	3.435**	-2.076	4.073***	-0.671	3.365**	-2.073	-1.798	4.366***
	(2.29)	(-0.55)	(2.74)	(-0.19)	(2.22)	(-0.54)	(-0.50)	(2.92)
VACANCY RATE	2.014***	1.856***	2.034***	2.043***	1.963***	1.806***	1.973***	2.103***
	(4.01)	(3.58)	(4.28)	(4.35)	(3.87)	(3.43)	(4.53)	(4.98)
CONTROLS LEVELS	YES	YES	YES	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	YES	NO	YES	NO	YES	YES	NO
R2	0.23	0.30	0.27	0.33	0.22	0.29	0.30	0.24
N	208	208	208	208	208	208	208	208

The table reports the estimated coefficients of the following regression:

$$\Delta\text{FICO 660}_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 HPE_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

ΔFICO 660$_i$ is the change in log loans held on portfolio by lenders in MSA i between 2006 and 2007. In columns (1)-(2), GSE SHR$_i$ is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. In column (3)-(4), GSE SHR$_i$ is Fannie Mae's and Freddie Mac's combined share of all outstanding mortgage loans in MSA i at the end of 2006. In columns (5)-(6) and (7)-(8), GSE SHR$_i$ is Fannie Mae's share only and Freddie Mac's share only respectively of all outstanding mortgage loans in MSA i at the end of 2006. HPE$_i$ is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ is a vector of controls at the MSA level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.6: Controlling for Growth in Agency Goals (Panel A)

	Δ FICO 660	Δ HPA	Δ Supply	Δ HIGH-LTI	Δ Denial Rate
	(1)	(2)	(3)	(4)	(5)
GSE SHR	0.874*	1.283***	1.876***	2.617***	-0.330***
	(1.72)	(2.96)	(3.02)	(3.31)	(-3.06)
GSE SHR × HPE	-1.117***	-0.906***	-1.112**	-1.668***	0.183**
	(-3.42)	(-2.83)	(-2.49)	(-2.89)	(2.40)
HPE	0.401***	0.376***	0.472**	0.702***	-0.101***
	(3.17)	(2.81)	(2.49)	(2.98)	(-3.35)
PL SHR	-4.456***	-2.473***	-4.692***	-5.175***	0.760***
	(-4.38)	(-4.98)	(-7.09)	(-5.93)	(5.58)
Δ GOALS	0.001				
	(0.00)				
Δ COMBINED GOALS		0.130	-0.116	0.024	-0.031
		(0.78)	(-0.42)	(0.07)	(-0.67)
OTHER GSE SHR	-0.031				
	(-0.10)				
VACANCY RATE	-1.013**	-0.599***	-0.902***	-1.410***	0.175***
	(-2.45)	(-4.46)	(-4.12)	(-4.64)	(3.89)
CONTROLS LEVELS	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	NO	NO
R2	0.25	0.60	0.69	0.62	0.71
N	418	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$\mathrm{Y}_L = \alpha + \beta_1 \text{GSE SHR}_L + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_L \times \text{HPE}_i + \vec{X}_i\gamma + \mathbb{1}_{L=\{i,g\}}\vec{X'}_{i,g}\gamma' + \epsilon_L$$

In column (1), $L = \{i, g\}$ and in columns (2)-(5), $L = \{i\}$. In column (1), GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. In columns (2)-(5), GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. Δ $\text{GOALS}_{i,g}$ is the change in the fraction of mortgages acquired that are eligible towards GSE g's goals in MSA i between 2006 and 2007. Δ COMBINED GOALS_i is the same measure, but calculated by combining Fannie Mae and Freddie Mac, in MSA i between 2006 and 2007. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.6: Controlling for Growth in Agency Goals (Panel B)

	Δ FICO 660	Δ HPA	Δ Supply	Δ HIGH-LTI	Δ Denial Rate
	(1)	(2)	(3)	(4)	(5)
GSE SHR	0.888*	1.345***	1.924***	2.707***	-0.343***
	(1.75)	(3.31)	(3.17)	(3.50)	(-3.20)
GSE SHR × HPE	-1.112***	-0.943***	-1.123**	-1.708***	0.191**
	(-3.40)	(-3.15)	(-2.60)	(-3.04)	(2.54)
HPE	0.403***	0.392***	0.481***	0.723***	-0.105***
	(3.19)	(3.14)	(2.62)	(3.17)	(-3.51)
PL SHR	-4.445***	-2.417***	-4.645***	-5.090***	0.747***
	(-4.35)	(-5.00)	(-7.06)	(-5.93)	(5.55)
Δ ADJ GOALS	0.033				
	(0.36)				
Δ COMBINED ADJ GOALS		0.103**	0.060	0.135	-0.023
		(2.36)	(0.86)	(1.54)	(-1.61)
OTHER GSE SHR	-0.021				
	(-0.07)				
VACANCY RATE	-0.996**	-0.600***	-0.886***	-1.398***	0.175***
	(-2.43)	(-4.56)	(-4.03)	(-4.65)	(3.95)
CONTROLS LEVELS	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	NO	NO
R2	0.25	0.61	0.69	0.63	0.71
N	418	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$\mathrm{Y}_L = \alpha + \beta_1 \text{GSE SHR}_L + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_L \times \text{HPE}_i + \vec{X}_i\gamma + \mathbb{1}_{L=\{i,g\}}\vec{X'}_{i,g}\gamma' + \epsilon_L$$

In column (1), $L = \{i, g\}$ and in columns (2)-(5), $L = \{i\}$. In column (1), GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. In columns (2)-(5), GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. Δ ADJ $\text{GOALS}_{i,g}$ is the change in the number of GSE goals satisfied per each mortgage acquired by GSE g in MSA i between 2006 and 2007. Δ COMBINED ADJ GOALS_i is the same measure, but calculated by combining Fannie Mae and Freddie Mac, in MSA i between 2006 and 2007. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.7: Controlling for FHA and VA Share

	Δ FICO 660	Δ HPA	Δ Supply	Δ HIGH-LTI	Δ Denial Rate
	(1)	(2)	(3)	(4)	(5)
GSE SHR	0.921*	1.251***	1.823***	2.480***	-0.304***
	(1.75)	(3.13)	(3.25)	(3.49)	(-3.12)
GSE SHR × HPE	-1.095***	-0.786***	-0.881**	-1.355**	0.126*
	(-3.32)	(-2.64)	(-2.15)	(-2.58)	(1.75)
HPE	0.387***	0.304**	0.353**	0.538**	-0.066**
	(2.99)	(2.44)	(2.01)	(2.49)	(-2.34)
PL SHR	-4.283***	-2.184***	-4.022***	-4.405***	0.575***
	(-3.91)	(-4.66)	(-6.54)	(-5.38)	(4.78)
FHA VA SHR	0.448	1.731***	3.051***	3.428***	-0.861***
	(0.37)	(3.26)	(3.44)	(3.07)	(-4.32)
VACANCY RATE	-0.967**	-0.554***	-0.787***	-1.255***	0.152***
	(-2.35)	(-4.38)	(-3.93)	(-4.58)	(3.85)
OTHER GSE SHR	0.041				
	(0.13)				
CONTROLS LEVELS	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	NO	NO
R2	0.25	0.65	0.73	0.67	0.77
N	418	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$\mathrm{Y}_L = \alpha + \beta_1 \text{GSE SHR}_L + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_L \times \text{HPE}_i + \vec{X}_i\gamma + \mathbb{1}_{L=\{i,g\}}\vec{X'}_{i,g}\gamma' + \epsilon_L$$

In column (1), $L = \{i, g\}$ and in columns (2)-(5), $L = \{i\}$. In column (1), GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. In columns (2)-(5), GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. FHA VA SHE_i is the FHA and VA share of mortgage originations in MSA i in 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.8: Additional GSE Portfolio-Level Outcomes

	Δ HIGH-LTV			Δ HIGH-LTV SHARE		
	(1)	(2)	(3)	(4)	(5)	(6)
GSE SHR	3.386***	1.249	0.009	0.301***	0.242**	0.129
	(4.12)	(0.91)	(0.01)	(5.29)	(2.08)	(1.34)
GSE SHR × HPE	-3.088***	-2.639***	-2.169***	-0.231***	-0.194**	-0.162**
	(-4.76)	(-3.16)	(-2.62)	(-4.57)	(-2.36)	(-2.06)
HPE	0.726**	0.828**	0.661**	0.122***	0.102***	0.077**
	(2.54)	(2.36)	(1.98)	(6.91)	(3.46)	(2.55)
PL SHR		7.076	6.979		-0.336	-1.922***
		(1.58)	(0.64)		(-1.59)	(-3.03)
OTHER GSE SHR		-1.966*	-1.979*		-0.039	-0.050
		(-1.75)	(-1.75)		(-0.70)	(-0.88)
VACANCY RATE		-2.626**	-2.349*		-0.060	-0.090
		(-1.98)	(-1.75)		(-0.94)	(-1.40)
CONTROLS LEVELS	NO	YES	YES	NO	YES	YES
CONTROLS CHANGES	NO	NO	YES	NO	NO	YES
R2	0.06	0.19	0.22	0.20	0.18	0.26
N	467	417	417	468	418	418

The table reports the estimated coefficients of the following regression:

$$Y_{i,g} = \alpha + \beta_1 \text{GSE SHR}_{i,g} + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_{i,g} \times \text{HPE}_i + \vec{X}_i\gamma + \vec{X'}_{i,g}\gamma' + \epsilon_{i,g}$$

$Y_{i,g}$ is GSE g's change in log acquisitions with LTV above 80 (columns 1-3), and change in the share of mortgage acquisitions with LTV 80 (columns 4-6) in MSA i between 2006 and 2007. GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.9: Purchases and Refinances (Panel A)

	Δ FICO 660		Δ Supply		Δ HIGH-LTI	
	Purchases	Refis	Purchases	Refis	Purchases	Refis
GSE SHR	0.203	1.166**	0.804**	2.258***	1.972***	3.618***
	(0.39)	(2.25)	(2.23)	(4.83)	(3.15)	(5.15)
GSE SHR × HPE	-1.042**	-1.530***	-0.378	-1.609***	-1.237**	-2.447***
	(-2.58)	(-3.85)	(-1.30)	(-4.28)	(-2.45)	(-4.33)
HPE	0.440***	0.427***	0.212*	0.626***	0.585***	0.968***
	(3.03)	(2.98)	(1.81)	(4.11)	(2.87)	(4.23)
VACANCY RATE	-0.663*	-1.377***	-0.540***	-0.683***	-1.479***	-1.423***
	(-1.84)	(-3.89)	(-4.17)	(-4.06)	(-6.56)	(-5.64)
PL SHR	-0.692	-6.032***	-3.560***	-3.625***	-5.681***	-5.136***
	(-0.64)	(-5.66)	(-8.68)	(-6.81)	(-7.96)	(-6.43)
OTHER GSE SHR	-0.594**	0.294				
	(-2.36)	(1.18)				
CONTROLS LEVELS	YES	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	NO	NO	NO
R2	0.14	0.25	0.72	0.50	0.68	0.50
N	418	418	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$Y_L = \alpha + \beta_1 \text{GSE SHR}_L + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_L \times \text{HPE}_i + \vec{X}_i\gamma + \mathbb{1}_{L=\{i,g\}}\vec{X'}_{i,g}\gamma' + \epsilon_L$$

In columns (1)-(2), $L = \{i, g\}$ and in columns (3)-(6), $L = \{i\}$. Columns (1), (3) and (5) ((2), (4) and (6)) include only purchase (refinance) loans. In columns (1) and (2), GSE $\text{SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. In columns (3)-(6), GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.9: Comparing Purchases and Refinances (Panel B)

	Δ FICO $660^{p,r}$	Δ Supply^{p,r}	Δ HIGH-LTI^{p,r}
REFI × GSE SHR	0.286	1.292**	1.245
	(0.34)	(2.14)	(1.33)
REFI × GSE SHR × HPE	-0.521	-1.406***	-1.264
	(-0.77)	(-2.83)	(-1.64)
GSE SHR	0.541	0.885**	2.173***
	(0.88)	(2.01)	(3.18)
HPE	0.308*	0.168	0.584***
	(1.72)	(1.17)	(2.62)
GSE SHR × HPE	-1.026**	-0.290	-1.210**
	(-2.21)	(-0.81)	(-2.18)
REFI	-0.357	-0.314	-0.260
	(-1.40)	(-1.31)	(-0.70)
REFI × HPE	0.251	0.502**	0.386
	(1.19)	(2.54)	(1.26)
VACANCY RATE	-1.020**	-0.612***	-1.451***
	(-2.48)	(-5.31)	(-8.12)
PL SHR	-3.362***	-3.592***	-5.408***
	(-3.25)	(-9.85)	(-9.57)
OTHER GSE SHR	-0.150		
	(-0.53)		
CONTROLS LEVELS	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO
R2	0.23	0.65	0.58
N	836	418	418

The table reports the estimated coefficients of the following regression:

$$Y_{L,k} = \alpha + \beta_1 \text{GSE SHR}_L + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_L \times \text{HPE}_i + \beta_4 \text{GSE SHR}_L \times \text{REFI}_k + \beta_5 \text{HPE}_i \times \text{REFI}_k$$

$$+ \beta_6 \text{GSE SHR}_L \times \text{HPE}_i \times \text{REFI}_k + \beta_7 \text{REFI}_k + + \vec{X}_i \gamma + \mathbb{1}_{L=\{i,g\}} \vec{X'}_{i,g} \gamma' + \epsilon_{L,k}$$

In column (1), $L = \{i, g\}$ and in columns (2)-(3), $L = \{i\}$. $Y_{L,k}$ is an outcome variable in loan-purpose bucket k. REFI_k is an indicator variable that takes a value of 1 (0) if the outcome relates to refinances (purchases). In column (1), $\text{GSE SHR}_{i,g}$ is GSE g's share of all outstanding mortgage loans in MSA i at the end of 2006. In columns (2)-(3), GSE SHR_i is the higher of Fannie Mae's or Freddie Mac's share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.10: MSA-Level Regressions with Combined GSE Share

	Δ HPA		Δ Supply		Δ HIGH-LTI		Δ Denial Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GSE SHR	0.818***	0.872***	0.889*	0.890*	1.346**	1.317**	-0.154*	-0.121
	(2.99)	(3.86)	(1.71)	(1.93)	(2.12)	(2.47)	(-1.87)	(-1.43)
GSE SHR × HPE	-0.647***	-0.683***	-0.580	-0.730**	-0.974**	-1.037***	0.103*	0.122*
	(-3.28)	(-4.04)	(-1.61)	(-2.23)	(-2.15)	(-2.63)	(1.76)	(1.97)
HPE	0.421***	0.468***	0.394*	0.549**	0.648**	0.748***	-0.093**	-0.111***
	(3.26)	(4.17)	(1.67)	(2.53)	(2.24)	(2.91)	(-2.49)	(-2.65)
PL SHR	-2.526***	-0.346	-4.858***	-1.724	-5.411***	-1.726	0.805***	0.796
	(-4.90)	(-0.35)	(-7.58)	(-0.89)	(-6.16)	(-0.76)	(5.70)	(1.59)
VACANCY RATE	-0.593***	-0.470***	-0.841***	-0.557**	-1.355***	-0.951***	0.169***	0.138***
	(-4.32)	(-3.04)	(-3.62)	(-2.29)	(-4.31)	(-2.92)	(3.56)	(2.62)
CONTROLS LEVELS	YES	YES	YES	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	YES	NO	YES	NO	YES	NO	YES
R2	0.59	0.70	0.66	0.77	0.60	0.73	0.69	0.75
N	209	209	209	209	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$Y_i = \alpha + \beta_1 \text{GSE SHR}_i + \beta_2 \text{HPE}_i + \beta_3 \text{GSE SHR}_i \times \text{HPE}_i + \vec{X}_i\gamma + \epsilon_i$$

GSE SHR is Fannie Mae's and Freddie Mac's combined share of all outstanding mortgage loans in MSA i at the end of 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ is a vector of controls at the MSA level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.11: HIGH SHR SHOCK Cut-Off (Panel A)

	Δ FICO 660	Δ HPA	Δ Supply	Δ HIGH-LTI	Δ Denial Rate
	(1)	(2)	(3)	(4)	(5)
SHR*	0.340**	0.118*	0.380***	0.412***	-0.059***
	(2.43)	(1.85)	(4.11)	(3.35)	(-3.67)
SHR*× HPE	-0.419***	-0.217***	-0.462***	-0.531***	0.087***
	(-3.36)	(-3.01)	(-4.41)	(-3.87)	(4.92)
HPE	0.029	0.014	0.039	0.044	-0.029***
	(0.40)	(0.69)	(1.26)	(1.07)	(-5.36)
PL SHR	-4.020***	-2.370***	-5.151***	-5.651***	0.761***
	(-3.88)	(-4.86)	(-7.93)	(-6.41)	(5.91)
VACANCY RATE	-1.051**	-0.570***	-0.862***	-1.357***	0.170***
	(-2.58)	(-3.95)	(-3.98)	(-4.46)	(3.79)
CONTROLS LEVELS	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	NO	NO
R2	0.21	0.61	0.70	0.63	0.73
N	418	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$Y_L = \alpha + \beta_1 \text{HIGH SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{HIGH SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \mathbb{1}_{L=\{i,g\}}\vec{X'}_{i,g}\gamma' + \epsilon_L$$

In columns (1)-(2), $L = \{i, g\}$ and in columns (3)-(6), $L = \{i\}$. HIGH SHR SHOCK is a dummy variable that takes a value of 1 if a high proportion of houses (above 7.5%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Table A.11: HIGH SHR SHOCK Cut-Off (Panel B)

	Δ FICO 660	Δ HPA	Δ Supply	Δ HIGH-LTI	Δ Denial Rate
	(1)	(2)	(3)	(4)	(5)
SHR*	0.271**	0.031	0.200**	0.202*	-0.028
	(2.04)	(0.58)	(2.05)	(1.78)	(-1.59)
SHR*× HPE	-0.376***	-0.126**	-0.314***	-0.350***	0.052***
	(-3.14)	(-2.18)	(-3.08)	(-2.93)	(2.79)
HPE	0.035	0.019	0.042	0.049	-0.030***
	(0.50)	(1.09)	(1.53)	(1.31)	(-6.22)
PL SHR	-3.519***	-1.974***	-4.451***	-4.817***	0.671***
	(-3.06)	(-4.71)	(-8.25)	(-6.25)	(5.48)
VACANCY RATE	-0.932**	-0.441***	-0.705***	-1.154***	0.137***
	(-2.27)	(-3.41)	(-3.20)	(-3.90)	(3.25)
CONTROLS LEVELS	YES	YES	YES	YES	YES
CONTROLS CHANGES	NO	NO	NO	NO	NO
R2	0.22	0.67	0.72	0.65	0.75
N	418	209	209	209	209

The table reports the estimated coefficients of the following regression:

$$Y_L = \alpha + \beta_1 \text{HIGH SHR SHOCK}_i + \beta_2 \text{HPE}_i + \beta_3 \text{HIGH SHR SHOCK}_i \times \text{HPE}_i + \vec{X}_i\gamma + \mathbb{1}_{L=\{i,g\}}\vec{X'}_{i,g}\gamma' + \epsilon_L$$

In columns (1)-(2), $L = \{i, g\}$ and in columns (3)-(6), $L = \{i\}$. HIGH SHR SHOCK is a dummy variable that takes a value of 1 if a high proportion of houses (above 5%) in MSA i became eligible for GSE acquisitions following the CLL change in 2006. HPE_i is the log of the Saiz measure of elasticity in MSA i. $\vec{X}_i$ ($\vec{X'}_{i,g}$) is a vector of controls at the MSA (MSA-GSE) level. Detailed variable descriptions are in Table A.1. Standard errors are clustered at the MSA level and observations are analytically weighted. ***, **, and * indicate significance at the 1%, 5%, and 10% level. T-statistics are shown in brackets.

Appendix B: Additional Details on the Housing Market in 2007H1

In this appendix, we provide detailed evidence and quotations to support the three key characteristics of the mortgage market during 2007H1 discussed in the main text.

5.1. Evidence that the GSEs Chose to Expand into Riskier Mortgages

In 2007H1, the GSEs expanded their high-risk loan purchases while private-label securitizers (PLs) exited the market. This raises the possibility that the GSEs' expansion was not a strategic choice but rather a passive drift while their strategy remained the same. However, public statements from GSE executives indicate that the GSEs actively decided to expand risky purchases.

For example, Freddie Mac's executive vice president of investments commented at Lehman Brothers' Annual Financial Services Conference in May 2007:

> "Today, the subprime market is experiencing maybe capital outflows... we're looking at the subprime market both as an opportunity to generate returns, but also as an opportunity to create some stability and leadership there and provide a way to continue."[19]

Similarly, in a February 2007 investor/analyst conference call, Fannie Mae's executive vice president and chief risk officer stated:

> "In our filing today, we also indicate that we have increased our participation in subprime product in 2006. Our purchases have been prudent and have been made when we concluded that they would contribute to our mission objectives or they would generate a profitable return."[20]

These statements suggest that the GSEs were not merely filling a gap left by the exiting PLs but were proactively expanding into higher-risk loans.

[19] "Freddie Mac at Lehman Brothers' 10th Annual Financial Services Conference," Fair Disclosure Wire (2007).

[20] "Fannie Mae Investor/Analyst Conference Call – Final," Fair Disclosure Wire, February 27, 2007.

5.2. Evidence that 2007H1 Was a Transitional Period with Increased Mortgage Default Risk

Market prices and practitioner commentary identify 2007H1 as a period during which the risk of home-price declines leading to mortgage defaults grew from small to significant. The evidence in market prices is documented in Stanton and Wallace (2010) and others, which shows that the ABX.HE index of Asset-Backed Securities (ABS) prices entered 2007 near par and then dropped substantially. The 2006 vintages, particularly the BBB and AA tranches, lost half their value in 2007H1, indicating a sharp increase in perceived mortgage risk.

Other market indicators also reflected this heightened risk. From January to March 2007, housing starts fell by 33%, signaling a significant slowdown in the housing market. In March 2007, New Century Financial, a leading subprime lender, saw its stock price fall by half. Additionally, *The Economist* reported that investors were "shunning subprime and all mortgages that seemed risky,"[21] highlighting the growing apprehension in the market.

Statutory filings and statements by the GSEs, along with concurrent press commentary, also demonstrate that the perceived risk of home prices dropping and causing credit losses increased significantly between the end of 2006 and mid-2007. Fannie Mae's filings show an evolving recognition of increasing risk. On December 6, 2006, in its 2004 annual report, Fannie Mae stated:

> "We expect that growth in total U.S. residential mortgage debt outstanding will continue at a slower pace in 2007, as the housing market continues to cool and home price gains moderate further or possibly decline modestly."[22]

By February 27, 2007, in its 12b-25 filing for FY2006, Fannie Mae expressed:

> "Our belief that home prices are likely to decline in 2007."[23]

[21] "Cracks in the Façade," *The Economist*, March 22, 2007.

[22] Fannie Mae 10-K for year ended 12/31/04, filed 12/06/06, p. 70.

[23] Fannie Mae 12b-25 for year ended 12/31/06, filed 2/27/07, p. 3.

In its 2006 annual report filed on August 16, 2007, Fannie Mae acknowledged:

> "We believe average home prices are likely to continue to decline in 2007."[24]

Similarly, Freddie Mac's economists adjusted their expectations over this period. In early 2007, Freddie Mac's economists forecasted house price appreciation in the first half of 2007 to be about 3.4%, roughly the rate of inflation.[25] However, by June 2007, Freddie Mac's chief economist acknowledged a shift in the market:

> "...as the housing market settles near the bottom of its cycle during the second half of this year, we will likely see national home price growth slow further with price declines in many parts of the U.S."[26]

These developments indicate that by mid-2007, both market participants and the GSEs recognized the increasing likelihood of continued home-price declines leading to credit losses. The transition during 2007H1 marked a significant shift in the housing market, with escalating mortgage default risk becoming a central concern for financial institutions and investors alike.

5.3. Details on GSEs' Mechanisms for Fostering Lending by FICO Score

The mechanisms by which the GSEs could foster lending with regionally targeted incentives varied depending on borrowers' credit scores. The role of a 620 FICO score as a boundary between qualitatively different underwriting standards has been closely studied (Bubb and Kaufman (2014); Keys et al. (2010)). The GSEs set this FICO cut-off as the line between automated approval (for scores above 620) and more manual approval processes (for scores below 620).

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[24] Fannie Mae 10-K for year ended 12/31/06, filed 8/16/07, p. 3.

[25] *National Mortgage News* 31(14), January 1, 2007, "Outlook 2007: Economist Expecting Big Home Price Drop," p. 7.

[26] *Investors Business Daily*, June 8, 2007, "House Prices Rising or Falling? Depends on Whom You Ask," by Paul Katzeff, p. A08.

The GSEs targeted borrowers with FICO scores below 620 through long-running programs aimed at riskier borrowers—Home Possible at Freddie Mac and MyCommunityMortgage at Fannie Mae. These affordable housing programs allowed the GSEs to adjust underwriting standards and offer more flexible terms for borrowers below the 620 FICO threshold. These programs could adjust boundaries for circumstances and regions at the GSEs' discretion and accounted for approximately 10% of acquisitions in 2007.[27]

Both GSEs had automated underwriting systems that implemented changes to standards below the 620 FICO cut-off as soon as they were updated. These systems allowed for regional variations; for example, Fannie Mae's Desktop Underwriter software indicated whether a property was in a region qualifying for a specific program.

The GSEs also promoted these programs by marketing them to newly eligible potential homebuyers. For instance, a press release from Freddie Mac in April 2007 announced enhancements to its Home Possible Mortgage program:

> "Freddie Mac is making homeownership a reality for more families by expanding eligibility and increasing flexibility for its Home Possible Mortgage products... The changes are designed to help lenders reach more borrowers with low to moderate incomes and to provide more financing options for first-time homebuyers."[28]

Similarly, Fannie Mae promoted its MyCommunityMortgage program as a way to "serve the needs of low- and moderate-income borrowers" by offering flexible underwriting guidelines.[29]

These efforts highlight how the GSEs used different mechanisms to foster lending among borrowers below and above the 620 FICO score threshold, adjusting their strategies to support the housing market during a period of increasing risk.

[27]See Table 3 in the Federal Housing Finance Agency report, "The Housing Goals of Fannie Mae and Freddie Mac in the Context of the Mortgage Market: 1996–2009," July 2009.

[28]Freddie Mac Press Release, April 2, 2007.

[29]Fannie Mae, "MyCommunityMortgage: Expanding the Reach of Homeownership," accessed via archived Fannie Mae publications from 2007.