AMERICAN UNIVERSITY

WASHINGTON, DC

Department of Economics

Working Paper Series

Distributional costs of the housing-price bust

By

Cynthia A. Bansak

and

Martha A. Starr

No. 2011-04

March 2011

http://www.american.edu/cas/economics/research/papers.cfm

Distributional costs of the housing-price bust

Cynthia Bansak
St. Lawrence University

Martha A. Starr
American University

March 2011

Abstract

In considering whether asset-price bubbles should be offset through policy, an important issue is who pays the price when the bubble bursts. A bust that reduces the wealth of well-off households only may have small welfare costs, but costs may be sizable if broad swaths of households are affected. This paper uses micro data from the American Community Survey to examine how the recent housing bust affected households' employment, homeownership, home values, and housing costs. To separate dynamics of the housing bust from those of the aggregate downturn, we differentiate between metropolitan areas that did and did not experience bubbles. We find that, for most measures, deteriorations in well-being were more severe in bubble metros than elsewhere, and for several measures, differential effects on less-educated households were also more severe. This underscores the importance of keeping housing markets from overheating, as burdens of adjustment fall differentially on people not well prepared to bear them.

JEL codes: R21, D31, D12, E32

Please address correspondence to: Martha A. Starr, American University, Department of Economics, 4400 Massachusetts Ave. NW, Washington, DC 20016-8029. Phone: 202-885-3747. Email: mstarr@american.edu. We are grateful to Ren Farley, Lisa Neidert, and Al Anderson for their expert guidance in the use of the American Community Survey data, and to session participants at the 2010 ASSA meetings and 2011 EEA meetings for valuable comments on earlier versions of this work.

Introduction

There was considerable debate in the years before the housing-bubble burst as to whether financial or monetary policy ought to address it. Key questions concerned how to establish when asset prices have drifted away from fundamentals (Gallin 2004; Himmelberg, Mayer, and Sinai 2005; Gürkaynak 2008) and what, if anything, governments should do when they do (Bernanke and Gertler 2001, Kohn 2006, Leamer 2007). A less-discussed issue concerns who pays the price when an asset bubble bursts. If a burst bubble temporarily depresses values of assets held for the long-term by better-off households, there may be no special social-welfare considerations that would weigh against letting the bubble run its course. However, bubbles that distort patterns of economic activity and affect incomes and wealth for broad swaths of households have much greater potential to inflict financial and economic hardship when they burst.

The experience of the recent boom and bust in housing prices provides a way to examine distributional effects of a burst bubble, albeit one with unusually pronounced aggregate effects. For the U.S. as a whole, the average home price rose 77% between 1998:Q4 and 2006:Q4, then fell 10% percent through 2009:Q4.[1] However, increases and decreases in home prices were quite uneven across the U.S. As shown in Figure 1, most metropolitan areas experienced moderate gains in home prices from 1998:Q4 through the peak for the area's series, with relatively modest declines thereafter; for the median metropolitan statistical area (MSA), for example, the average home price rose 59% from 1998:Q4 though the peak for the area, and slipped 5% thereafter. However, a subset of MSAs experienced much more dramatic increases and decreases: in 37 of the 284 areas for which data are available, housing prices rose by 100% or more and fell by 25% or more thereafter. Examining what happened in these 'bubble' metros, above and beyond what happened elsewhere, gives us a basis for characterizing what happens to who when housing bubbles unwind.

Some work to date has examined distributional effects of the 'Great Recession' of 2007-09, in which the housing-market bust played a central role. Existing research shows that increases in unemployment have been concentrated among groups who usually bear the brunt of job loss in recessions: workers in construction and manufacturing, those with less education, racial and ethnic minorities, and the young (Elsby, Hobijn, and Şahin 2010). Moreover, metropolitan areas that had experienced large housing-price swings are known to be among those that experienced some of the steepest increases in unemployment (e.g. Wial and Shearer 2010). In terms of the impact of declining home prices on household wealth, research suggests that households in the middle of the income distribution have been especially hard hit, given the major role home equity plays in their net worth (Baker and Rosnick 2008). However, studies to date have not aimed to distinguish between distributional effects of burst housing-price

[1] Authors' computations from the Federal Housing Finance Agency's all-transaction home-price index.

bubbles and those of aggregate downturn in general. Of course, the two cannot be separated completely, given the central role played by the housing-price bust in causing the aggregate downturn. But if one had a sufficiently large and rich household data set that contained information on where respondents lived, one could compare changes in households' incomes, employment, and other key variables in areas experiencing deflating bubbles, to changes experienced by similar households in areas that were not -- which would help illuminate whether distributional effects of the downturn are different in post-bubble metros than they are in other places, and if so how.

This paper conducts such an analysis using data on millions of households from the U.S. Census Bureau's American Community Survey (ACS). Since 2005, the ACS has collected social, demographic, housing and economic information from nationally-representative, cross-section samples of 3 million households per year. Presently data are available for 2005-2009, enabling us to examine with good precision how the bursting of the housing price bubble after 2006 has affected households at different income levels. In particular, we use home-price information from the Federal Housing Finance Agency (FHFA) to distinguish between metropolitan areas that experienced a boom and bust in housing prices, and those that did not. Then taking educational attainment to proxy for permanent-income, we measure how employment, homeownership, home values, and housing costs changed as the housing bubble deflated, for various permanent-income groups. In brief, we find that, for most measures, deteriorations in well-being were more severe in bubble metros than elsewhere, and for several measures, differential effects on low- and middle-income households were also more severe. This underscores the importance of keeping housing markets from overheating, as burdens of adjustment fall especially on people not well prepared to bear them.

The next section of the paper lays out mechanisms via which housing-market booms and busts affect the broader economy and different types of households within it: namely, swings in residential investment, employment in real estate and finance, wealth-effects on spending, housing wealth, and housing costs. The third section covers the data and methodology used for the study, including the means we use to distinguishing between 'bubble' versus other metropolitan areas and our difference-in-difference approach for separating effects of housing-price busts from those of the aggregate downturn. The fourth section presents the results, while the fifth section summarizes and concludes. We view our results as lending further support to the argument that monetary and financial policy oriented to social welfare should tackle bubbles *ex ante* rather than *ex post*.

Conceptual issues and previous research

As background to our empirical work, we first outline key mechanisms via which bursting of a housing-price bubble could be expected to affect key measures of household welfare like employment,

homeownership, housing wealth and housing costs, paying special attention to the dynamics that may cause these effects to be distributed differentially along two dimensions. The first dimension can be called *inter-metropolitan*, that is, referring to differences between metropolitan areas that experienced housing-price bubbles (to be defined below) and those which did not; the second can be called *intra-metropolitan* and refers to households at different positions in the income distribution within each metro type. The five issues we single out are: residential investment, home sales and financing, wealth-effects on spending, homeownership and home values, and housing costs. See also Case and Quigley (2008) on unwinding of housing booms.

1) Residential investment. Periods of unusual run-ups in home prices have tended to be associated with booms in residential investment, which in turn raise incomes and employment (Fair 2004, Case and Quigley 2008).[2] Geographically, construction booms might seem likely to be concentrated in areas with housing bubbles, as rising home prices raise the returns to residential investment. However, Glaeser, Gyourko, and Saiz (2008) argue that, on the contrary, bubbles tend to form in places where land zoned for new construction is scarce, so that rising demand pushes prices up rather than eliciting new supply. Thus, whether bubble metros will have disproportionate loss of construction jobs is an open question.

In terms of distributional effects of declining construction employment, loss of construction jobs can be expected to have regressive effects. Construction jobs are relatively important for workers without high school degrees: for example, in 2005-06, about 16% of workers without high school degrees were employed in construction, compared to 8% and 3% of high-school and college graduates respectively.[3] Moreover, in construction as in other cyclically-sensitive sectors, less-educated workers tend to be laid-off disproportionately in when business turns down (e.g. Gramlich 1974, Blank 1989, Hoynes 2000). Thus, we expect a differential contraction in construction jobs to cause a relatively large decline in total employment for less-educated workers.

2) *Home sales and financing*. Because home sales tend to rise unusually during housing-price bubbles (Leamer 2007), employment and incomes in activities related to home sales (real estate brokers, property appraisers, mortgage brokers, real-estate lawyers, etc.) also tend to rise (see, e.g., Hsieh and Moretti 2003). Thus, when home prices and sales fall, we would expect employment and incomes of people employed in these activities to decline as well. As jobs in these areas tend to require higher

[2] Thus, when home prices were rising robustly in 2003-04, residential investment added ½ percentage point to growth of real GDP, but in 2007-08 when they had started to fall, declining residential construction lowered growth by 1 percentage point. Figures from the Bureau of Economic Analysis, National Income and Product Accounts Table 1.5.2, as of December 15, 2009.
[3] Authors' computations, weighted data from the American Community Survey. See also Appendix Table A2.

levels of education and training, job loss here may affect people in the middle-to-upper part of the income distribution. Conceivably this may offset regressive effects of the disappearance of construction jobs.

3) *Wealth effect on spending*. A decline in home prices reduces the net worth of homeowners, which via the 'wealth effect' would be expected to lower their consumption spending in line with the lower value of their lifetime resources.[4] Research by Case, Quigley and Shiller (2005), Carroll, Otsuka and Slacalek (2006), and Bostic, Gabriel and Painter (2009) suggests that, *ceteris paribus*, a $1 increase in housing wealth would boost spending by 4-8 cents, with the effect phasing in over the next 2 or 3 years.[5] Thus, reductions in home values on the order of magnitude seen in the post-2006 housing-price bust would be expected to depress consumer spending appreciably.

How such wealth-effects on spending would affect employment and incomes across metropolitan areas and across different categories of workers is not clear from existing research. Geographically, we might expect employment to fall somewhat more in areas that experienced housing-price bubbles than elsewhere, due to declining demand for locally-produced goods and services. However, if the decline in spending follows the usual pattern in cyclical downturns, whereby spending on durable goods falls disproportionately when aggregate spending declines (Stock and Watson 1999), employment reductions due to wealth-effects may be concentrated wherever domestic production of durable goods tends is centered.[6] Here again, it would be expected that less educated workers would be laid off differentially when demand declines.

4) *Homeownership and home values*. Because returns to homeownership seem so high during bubbles, and costs of waiting to buy rise, households that might otherwise rent may instead buy via leverage, taking on debt payments that are high relative to their incomes. Especially for households who bought late in the boom, a subsequent price drop can leave them holding an asset worth less than the debt associated with it, with little free cash-flow to spare. This problem was much exacerbated by growth of subprime lending in the past 10-15 years, where the availability of low- or no-downpayment loans increased the likelihood of going 'underwater' when housing prices turned down, and mortgage payments on a non-negligible share of subprime loans were re-setting to higher levels just as housing

[4] See Iacoviello (2010) for discussion.
[5] As these studies discuss, changes in housing wealth appear to have stronger effects on consumption than equivalent changes in stock-market wealth. It is also likely that the housing-wealth effect has strengthened over time due to greater opportunities to cash out gains in home equity via mortgage refinancing (Muellbauer 2008).
[6] Using data from the Consumer Expenditure Survey, Bostic, Gabriel and Painter (2009) find that changes in housing wealth especially increase spending on non-durable goods. Note that, whereas their study aimed to characterize effects of wealth on consumption, ours is in its effects on production and employment; given the differential importance of imports across categories of goods, it is not clear that higher spending on nondurable goods necessarily means higher domestic production of them.

prices peaked (Gramlich 2007). We know from financial data that defaults and foreclosures have increased significantly since 2007, especially in markets where subprime lending had grown most robustly; we also know that subprime lending tended to grow most rapidly in areas that had relatively large black and Hispanic populations (Mayer and Pence 2008). Still, the evidence is less than clear on what types of households have had to exit from financially unsustainable homeownership arrangements: because the financial data contain little information on household characteristics, we know only generally what sorts of borrowers have been caught in this sort of pinch.

5) *Housing costs*. Areas with housing bubbles are known to have high costs of housing relative to incomes, both for homeowners and for renters, in good part because monthly payments for mortgages, taxes, and insurance are proportionate to high home values (e.g. Case and Shiller 2003). Thus, bursting of a housing price bubble could be expected to result in lower monthly housing costs relative to incomes for *new* homebuyers, whose contractual payments will be linked to now-lower home prices; however, it may not have much effect on housing costs of existing homeowners who remain in their homes. Thus, in the first years after a bubble bursts, it is unclear how much housing costs of homeowners in bubble metros would change relative to those of homeowners elsewhere. At the same time, the drop-off in sales associated with a burst bubble could be expected to increase vacancy rates, which may put downward pressure on rents. In this case, the end of a bubble may favor renters relative to owners, by taking the heat off increases in their monthly housing costs (see Case and Cook 1989).

Data and methodology

The data for this study come from the American Community Survey, an annual cross-section survey conducted by the U.S. Census Bureau. The survey was introduced to measure changes in social, economic, and demographic changes in the U.S. population between the decennial censuses and uses a questionnaire similar to its former 'long form'. As with the census, participating in the survey is required by law. About 250,000 households per month receive the questionnaire in the mail, yielding a sample size of about 3 million households per year (a 1 in 40 sample).[7] The ACS sample has been broadly representative geographically since 2005, with data presently available for the five waves between 2005 and 2009.[8] As our analysis distinguishes between areas that did and did not experience housing-price bubbles and consistent repeat-sales data are available for metropolitan areas only, we confine our analysis to households in metropolitan statistical areas (MSAs).[9] Such households include

[7] The ACS makes numerous efforts to contact respondents who do not initially reply, resulting in eventual response rates of 97-98%. See U.S. Census Bureau (2009).
[8] In 2001-2004, the ACS sample included 800,000 households and was intended to represent areas with populations of 1 million or more. In 2005, the sample size was increased to 3 million households, with the intention of representing areas with populations of 65,000 or more.
[9] People living in group quarters are also excluded from the analysis.

about 225 million people, or about three-quarters of the U.S. population.[10] To implement the analysis, we make use of the Integrated Public Use Microdata Series (IPUMS) compiled by the University of Minnesota (Ruggles et al., 2010). Resulting sample sizes are large: For the 2005-09 surveys, the IPUMS data contain an average of about 844,000 households per year living in metropolitan areas, encompassing an annual average of 2.1 million persons.

To measure how the housing-market bust has affected households with different characteristics, we categorize metropolitan areas into those which experienced a pronounced boom and bust in housing prices, and those which did not. For this purpose, we use the quarterly all-transaction house-price indexes from the Federal Housing Finance Agency (FHFA), which are weighted, repeat-sales indexes computed for single-family properties having a mortgage purchased by Freddie Mac or Fannie Mae. While the FHFA data have certain disadvantages relative to the S&P/Case-Shiller home-price indexes,[11] the former are available for all of the MSAs in our analysis while the latter are not.

To identify MSAs that experienced housing-price bubbles that burst, we classify MSAs as having had a 'burst bubble' if the FHFA price index increased by at least 100% after 1998:Q4 and decreased from the peak for that metro by least 25% from the peak through 2009:Q4.[12] As shown in Table 1, 37 of the 284 MSAs identified in the IPUMS data experienced a burst bubble by this definition; all were located in California, Florida, Nevada, and Arizona (see Appendix Table 1 for the list). This definition singles out metropolitan areas that underwent both sizable booms and sizable busts in housing prices; as such, it captures relatively severe bubbles. There is of course no assurance that our definition captures the concept of a bubble as a period when market prices diverged significantly from prices implied by the underlying value of housing services (see e.g. Himmelberg, Mayer, and Sinai 2005, or Goodman and Thibodeau 2008, for discussion). But given the amplitudes of the upswings and downswings in the data, we expect that our definition does a reasonably good job of identifying metropolitan areas where a bubble in this sense occurred.

In what follows, we compare changes in various types of household- or person-level economic outcomes across bubble and non-bubble markets and across households or persons at different levels of permanent income. To abstract from differences in levels of these measures across markets and across permanent-income groups, and focus on effects of the housing-price bust, we use a difference-in-

[10] Authors' calculation from the 2005-09 ACS five-year estimates.
[11] See the Office of Federal Housing Enterprise Oversight (2008) for details.
[12] Note that, for the 11 largest MSAs, the FHFA provides data for metropolitan divisions within the MSA rather than the MSA itself. In these cases, we computed price changes for the MSA as population-weighted averages of changes for the metropolitan divisions. Note that, in any event, all divisions within a given MSA had the same categorization in 9 of the 11 cases.

difference approach. Specifically, we pool data from the 2005-09 waves of the ACS and run regressions of the following form:

$$Y_{it} = \sum_{t=1}^{5} \beta_t D_{it} \tau_{it} + \sum_{t=1}^{5} \alpha_t (1-D_{it}) \tau_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is a given socioeconomic measure for household or person i in survey year t, D_{it} is a dummy variable indicating whether the household or person resided in a 'bubble' metro in year t, and τ_{it} is a dummy variable indicating the survey year. The regression is run with the constant omitted, and household or person weights are used to make the data representative of the metropolitan population as a whole. Thus, the estimated α_t's and β_t's from these regressions measure means in year t for the variable of interest in bubble and non-bubble metros respectively. Standard errors are computed robustly and allow for clustering at the MSA level.

To measure the effect of the bursting of the housing-price bubble, we compare changes occurring between 2006 and 2009 in bubble versus other metros, which requires testing whether the linear combination $\{\beta_{09} - \beta_{06}\}$ differs significantly from $\{\alpha_{09} - \alpha_{06}\}$. We take 2006 to be the turning point of the bubble because, for 29 of the 37 metropolitan areas we classify as 'bubbles', the FHFA data show the peak price to have occurred in that year; for the others, it occurs in adjacent quarters (in 2005:Q4 for five metros and in 2007:Q1 for three). This is not a strict difference-in-difference approach to measuring effects of bubbles, in the sense that, perhaps more than is usually the case when housing bubbles burst, the bursting of the bubbles under study had appreciable spillover effects on other metros, so that some part of the observed change, $\{\alpha_{09} - \alpha_{06}\}$, also reflects the busts. But what it does is tell us differential effects of the bust in areas that experienced bubbles, above and beyond those of the general decline in economic conditions that occurred in other areas during in this period.

To measure whether effects fell differentially within the population, we need to differentiate among households or individuals using variables that are not themselves endogenous to changes related to the housing bust. For this purpose, we use the longstanding approach of taking educational attainment to proxy for permanent income (see e.g. Blau and Graham 1990, Bernheim and Scholz 1993). Specifically, we examine changes by education levels, distinguishing between persons who had not completed a high school diploma; those who had completed a high school diploma but not a four-year college degree; and those who had completed a four-year college degree. In the case of variables measured at the

household level (homeownership, home value, housing cost), education level is measured for the householder.[13] Analogous to the case above, this implies estimating the regression,

$$Y_{it} = \sum_{t=1}^{5} \sum_{j=1}^{3} \beta_{jt} D_{it} \tau_{it} E_{j,it} + \sum_{t=1}^{5} \sum_{j=1}^{3} \alpha_{jt} (1-D_{it}) \tau_{it} E_{j,it} + \varepsilon_{it} \quad (2)$$

where the Ej,it's are dummy variables indicating the person or householder's education level. Then for a given education group j, we measure whether the 2006-09 change differed in bubble versus other metros by testing whether the linear combination $\{\beta j,_{09} - \beta j,_{06}\}$ differs from $\{\alpha j,_{09} - \alpha j,_{06}\}$. We can also compare changes *across* education groups within each metro type; specifically, we test whether changes experienced by those who did not complete high school and those who did receive high school diplomas, respectively, differed from those experienced by college graduates. In bubble metros, this implies testing whether the following two terms are equal to zero:

Below HS versus college graduate: $[(B_{1,09} - B_{1,06}) - (B_{3,09} - B_{3,06})]$

HS graduate versus college graduate: $[(B_{2,09} - B_{2,06}) - (B_{3,09} - B_{3,06})]$

with analogous terms for other metros being:

Below HS versus college graduate: $[(\alpha_{1,09} - \alpha_{1,06}) - (\alpha_{3,09} - \alpha_{3,06})]$

HS graduate versus college graduate: $[(\alpha_{2,09} - \alpha_{2,06}) - (\alpha_{3,09} - \alpha_{3,06})]$

Finally, we can test whether differential effects on less-educated groups were heavier in bubble metros than they were elsewhere by testing whether the following two terms equal zero:

Below HS versus college graduate: $[(B_{1,09} - B_{1,06}) - (B_{3,09} - B_{3,06})] - [(\alpha_{1,09} - \alpha_{1,06}) - (\alpha_{3,09} - \alpha_{3,06})]$

HS graduate versus college graduate: $[(B_{2,09} - B_{2,06}) - (B_{3,09} - B_{3,06})] - [(\alpha_{2,09} - \alpha_{2,06}) - (\alpha_{3,09} - \alpha_{3,06})]$

Table 2 shows detailed definitions of the variables used in the analysis, along descriptive statistics.

Findings

[13] In the Census definition, the 'householder' is the person (or one of the persons) in whose name the housing unit is owned or rented. If a married couple owns the home jointly, either spouse may be the householder. People who undertook some college studies without completing a degree or who completed a two-year degree only are included with high-school graduates.

As our primary interest is in the effects of burst housing-price bubbles, above and beyond those of the recession that occurred during this period, our discussion of findings focuses on the difference-in-difference estimates. Estimates of levels of variables derived from regressions (1) and (2) are presented in the appendix.

Overall employment probabilities

To provide an overview of changes in employment opportunities, Table 3 shows how probabilities of employment changed over the 2006-09 period, examining differences across bubble vs. other metropolitan areas and across different education groups.[14] Results show probabilities of employment to have fallen significantly in both bubble and other metropolitan areas between 2006 and 2009; moreover, within each type of area, employment probabilities fell for all education groups. However, the magnitude of job loss was more severe in bubble metros than elsewhere: the overall probability of employment fell by 5.6 percentage points in bubble metros versus 3.2 percentage points elsewhere, where the difference between the two is statistically significant. This confirms the general impression that labor-markets in areas with burst housing-bubbles declined disproportionately in the Great Recession.

The results also show that, for each education group, the employment probability fell by significantly more for workers in bubble metros than for comparable workers elsewhere. In both bubble metros and elsewhere, workers who had not completed high-school diplomas saw significantly greater declines in employment prospects than workers with college degrees; thus, for example, in bubble metros the employment probability for the average worker without a high-school diploma fell by 7.4 percentage points from 2006 to 2009, compared to a decline of 2.9 percentage points for the average worker with a college degree. Job loss was also significantly greater for workers with high-school diplomas but not college degrees compared to college graduates, and in this case, the differential between the two was significantly larger in bubble metros than it was elsewhere. In other words, factoring out the effects of the aggregate downturn, the *extra* effects of the housing-market bust especially affected employment opportunities of high school graduates, relative to the other two groups. The explanation for this pattern can be traced to patterns of job loss across sectors, to which we now turn.

Residential investment

Results from the ACS data confirm that loss of construction jobs played an important role in the extra job loss experienced in bubble metros after housing prices turned down in 2006. As shown in Table 4, the probability of employment in construction fell by 2.5 percentage points in bubble metros between 2006 and 2009, compared to 1.1 percentage points elsewhere. This extra decline in construction jobs in

[14] Note that regressions with discrete outcomes are estimated as linear probability models.

bubble vs. other metros accounted more than half of the extra decline in total employment in bubble metros over this period (i.e. 1.4 of the 2.4 percentage-point decline). This is broadly supportive of Case and Quigley's (2008) argument that effects of declining residential investment on employment and incomes are among the most pronounced real effects of housing-market busts.

In terms of how the loss of construction jobs was distributed across education groups, the results show construction-employment probabilities to have fallen significantly for almost all education groups, both inside and outside of bubble metros. However, in both types of areas, employment probabilities fell significantly more for people without high-school diplomas and for high-school graduates than they did for those with college degrees. Thus, for example, in bubble metros, the probability of having a construction job fell by 5.0 percentage points for labor-force participants without high-school diplomas but only 0.7 percentage points for those with college degrees; this extra decline of 4.4 percentage points in bubble metros was significantly larger than it was elsewhere (2.2 percentage points). Put differently, the differential loss of construction jobs by less-educated workers in bubble metros was greater than the differential loss for such workers elsewhere, indicating a separate regressive effect of the housing-market bust.

Home sales and financing

To examine how the housing-market bust affected employment in home sales and financing, Table 5 shows comparable results for the probability of employment in finance, insurance and real estate (FIRE). As with construction, with FIRE the employment probability fell in both bubble metros and elsewhere, with the extent of the decline being significantly larger in bubble metros. Declining FIRE employment also contributed importantly to the differential decline in the total employment probability in bubble metros, although its influence was not as large as that of construction: whereas construction accounted for 58% the extra decline, FIRE employment accounted for 29% (0.7 of 2.4 percentage points).

Across education groups, patterns of job loss were quite different for FIRE employment than was seen for construction. In bubble metros, the probability of being employed in a FIRE job fell by significantly more for high-school and college graduates than it did for people without high-school diplomas; in other metros, the employment probability came down uniformly across education groups. Thus, costs of the extra loss of FIRE jobs that occurred in bubble metros fell mostly on workers with high-school education or more, whereas with construction the costs of the extra job loss fell on workers with high-school education or less. The fact that high-school workers were among those hit relatively hard in *both* cases is the primary explanation for why their overall employment probabilities fell differentially, as discussed above. College-educated workers in bubble metros were hard hit by job loss in finance,

but got off relatively lightly in loss of jobs in construction, while the opposite was true for workers without high school degrees. However, workers having only high school educations experienced differential job losses in both cases, suggesting they are especially vulnerable to labor-market dislocations when housing bubbles burst.

Wealth effect on spending

Table 6 shows how employment probabilities changed in sectors producing consumer goods and services. Taking goods and services together, there is little evidence of differential effects across areas: overall, the probability of being employed in a consumer-oriented job fell by 1 percentage point in bubble metros and 0.7 percentage points elsewhere, where the difference between the two is not statistically significant. Across education groups, many of the estimated changes between 2006 and 2009 are themselves not statistically significant, nor are differences across bubble vs. non-bubble metros and across education groups within each area statistically significant. Thus, unlike construction and FIRE employment, there do not appear to be significant differential distributional effects associated with job loss from wealth effects.

However, there is something of an interesting difference between employment in production of consumer goods, versus in production of consumer services. In particular, declining employment in goods affected non-bubble metros more than bubble ones, while the opposite was the case for declining employment in services; this is consistent with the idea that wealth effects related to services would tend to fall locally, while those related to goods would fall wherever production of relevant consumer goods was centered. In both cases, these effects can be traced to differential effects for high-school graduates; for the other two groups, estimated differences between workers in bubble vs. other metros are statistically insignificant. Still, in neither goods nor services are there extra differential effects for workers in particular education categories in bubble metros. Thus, differential effects in overall employment probabilities (Table 3) appear to come primarily from the bust in residential construction and decline in finance and real estate, rather than the wealth effect, which is again consistent with Case and Quigley's (2008) prediction.

Housing wealth

Table 7 shows results from the ACS related to housing wealth. As indicated in the left-hand panel of the table, the probability of homeownership fell in both bubble and other metros, with the decline significantly larger in bubble metros than it was elsewhere. Homeownership fell for all education groups in both types of metropolitan areas; only in the case of high-school graduates was it significantly larger in bubble metros than elsewhere. Moreover, in both types of metros, homeownership rates fell by significantly more among households where the householder lacked a high-

school diploma or had a high-school diploma only but not a college degree. Nonetheless, declines for less-educated groups were not significantly larger in bubble metros than they were elsewhere, which runs counter to the expectation that this group may have fallen out of homeownership differentially as the housing boom unwound. Rather, the data suggest that, to the extent that relaxed lending standards boosted homeownership rates among less educated households during the boom years and declining incomes and rising credit problems pushed them back down thereafter, the swings were no more acute in bubble metros than they were elsewhere.[15]

The right-hand panel of the table shows changes in average home values between 2006 and 2009.[16] Given that we differentiate between bubble vs. other metros based on the extent of decline in home prices, it is not surprising to see that average home values dropped substantially more in bubble metros than elsewhere: 35% vs. 4% over the 2006-09 period.[17] Here we see quite different distributional patterns between bubble and other types of metropolitan areas. In areas that did not experience housing-price bubbles, average home prices slipped by around 5 percentage points among all education groups, where differences across them are not statistically significant. In areas with bubbles, however, prices fell by significantly more for homeowners without high-school diplomas or with high-school diplomas only compared to those with college degrees. Thus, the *differential* declines in home prices for less educated households were significantly larger in bubble metros than they were elsewhere. This is qualitatively similar to what is found in the 'tiered' S&P/Case-Shiller indexes, although their data show larger spreads between low- and high-tier homes.[18] Especially given that home equity represents a large share of the net worth of homeowners of more moderate means (see e.g. Bertaut and Starr-McCluer 2000, Starr 2009), the larger percentage decline in home prices at the lower end of the distribution implies a larger proportional decline in wealth for these homeowners compared to those owning higher-priced homes.

Housing costs

[15] Findings of broad-based declines across areas and groups are consistent with several studies finding that in the years before the bubble burst, housing-market dynamics were increasingly governed by common aggregate factors, rather than regional or local variables, suggesting an importance of credit-market changes or other national-level factors (see e.g. Fu 2007 and Del Negro and Otrok 2007).
[16] Note that the ACS data for home values are top-coded at $1 million for 2005-08 and $6 million for 2009. Thus, the models for home values are estimated as tobit regressions with an upper limit of (the log of) $1 million.
[17] Note that, unlike the FHFA data, home prices in the ACS are self-reported, include both single-family homes and other types of property, and are not repeat sales measures. Goodman and Ittner (1992) find that self-reported prices generally correspond reasonably well to commercial valuations of property, although it is possible that accuracy is lower in periods when prices are changing unusually.
[18] For example, the median decline-from-peak for the 20 metropolitan areas covered in the S&P/Case-Shiller data was 37.4% for low-tier homes versus 19.4% for high-tier homes through the end of 2008.

Finally, the top panel of Table 8 shows changes in housing costs between owners and renters over the 2006-09 period, both in terms of the level of real monthly housing costs and the share of households having housing costs in excess of 40% of their incomes (see Table 2 for precise definitions of housing costs). While we might expect bursting of a housing bubble to lower housing costs in bubble metros relative to those elsewhere, and within bubble metros to attenuate increases in monthly costs for renters, the data do not show much evidence of these dynamics over the 2006-09 period. As shown in the left-hand panel of the table, real housing costs rose by statistically indistinguishable amounts for both owners and renters in bubble metros and renters elsewhere; only among homeowners elsewhere were increases somewhat more modest. The larger increase in housing costs for homeowners in bubble metros, relative to homeowners elsewhere, possibly reflects interest-rate resets and other scheduled increases in mortgage payments that happened to phase in over the period. That rents rose in bubble metros at the same rate as elsewhere, despite larger increases in vacancy rates, may be due in part to staggered adjustment of rental contracts and/or downwardly-rigid nominal rents (Genesove 2003). Taken together, these differences imply that renters did better relative to owners in bubble metros than they did elsewhere, but only because elsewhere housing costs of renters increased by more than those of homeowners while in bubble metros they kept pace. A virtually identical pattern shows up in the share of households having housing costs in excess of 40% of their incomes, shown in the right-hand panel of the table. In a nutshell then, three years after housing prices turned, the bursting of the bubble did not appear to have alleviated high costs of housing in bubble metros, either for owners or for renters.

From examining changes in the levels of the housing-cost variables (Appendix Table A4), it can be seen that, unlike most of the other variables analyzed here, the housing-cost measures did not turn in 2006, after housing prices peaked; rather they continued rising until 2008 and only thereafter turned down. Thus, if we repeat the above analysis computing changes for 2008-09 instead of 2006-09, we see some evidence of declines in housing costs. As shown in the bottom panel of Table 8, both measures of housing costs in both types of metros fell for virtually all groups after 2008, and they fell by significantly more in bubble metros than elsewhere. However, in both types of metros, housing costs fell by more for owners than they did for renters, with the extent of the differential change similar in magnitude in the two metro types. Thus, although the housing bust did lower housing costs in bubble metros relative to others, there is no evidence of a differential benefit going to renters.

Summary and conclusions

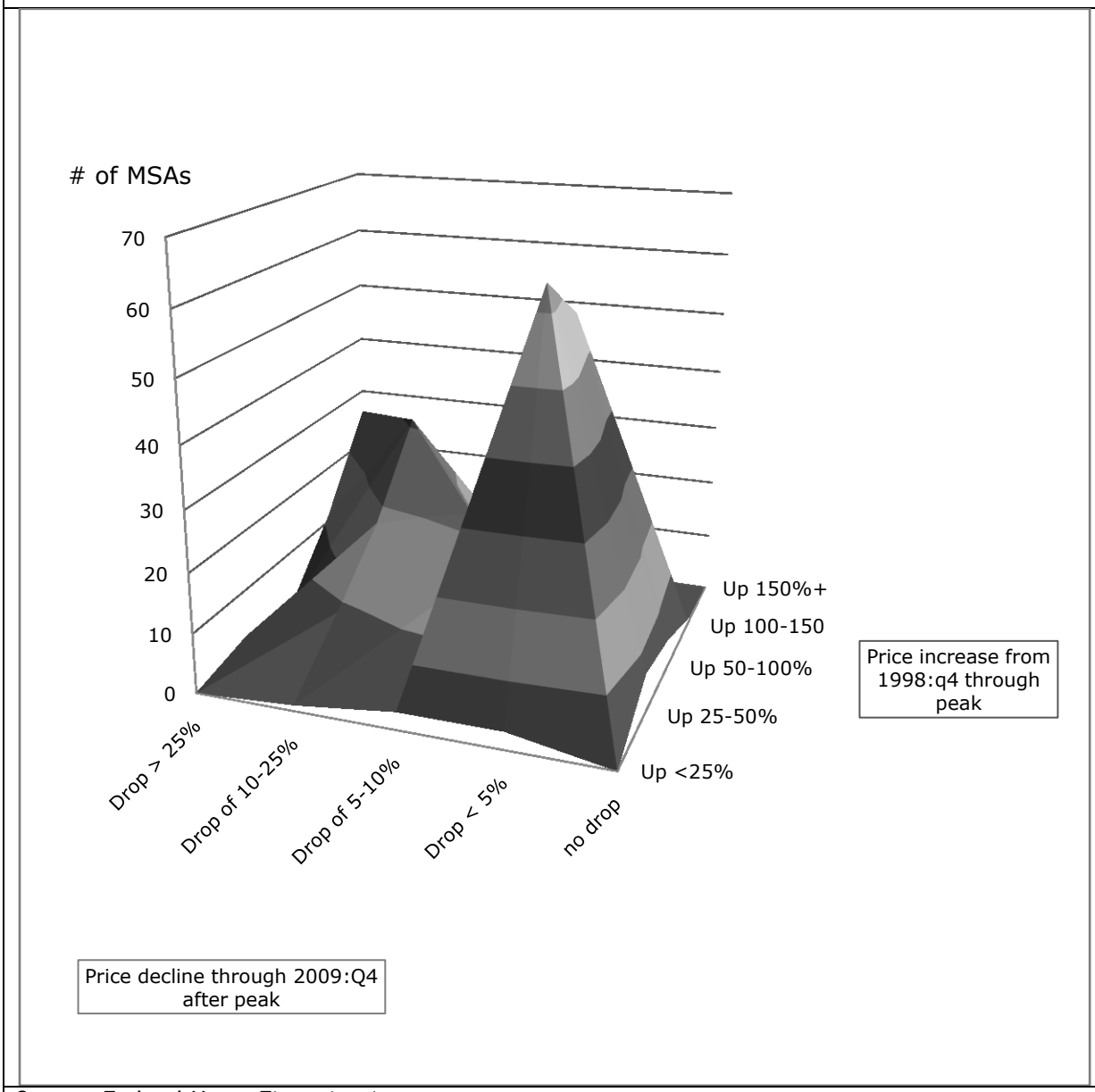
To summarize, this study has four key findings with respect to the distributional effects of the post-2006 housing-market bust:

- Job loss in construction, finance, and real estate played a central role in the adverse employment effects of burst housing bubbles; estimated employment effects of the 'wealth effect' running in reverse (i.e. declining spending on consumer goods and services due to lower home values) were relatively modest. This is consistent with Case and Quigley's (2008) view that unwinding of housing bubbles is driven centrally by the contraction of economic activities that 'overgrow' when bubbles are in progress.
- Job loss due to bursting of housing-price bubbles especially affected workers in the middle of the income distribution. While workers without high school degrees were hit hard by loss of construction jobs, and those with college degrees lost jobs in finance and real estate, workers having high-school diplomas only were subject to both sources of job loss.
- While declines in homeownership occurring after bubbles burst were spread relatively evenly across households with differing education levels, percentage declines in home values were significantly larger for less educated households than they were for those with college degrees.
- In the first few years after housing prices turned, declining home prices had not yet brought much relief in terms of lower housing costs for either homeowners or renters.

These findings suggest that declines in key elements of economic well-being associated with burst housing bubbles tend to be concentrated among households with relatively modest means, and for whom housing wealth is likely to be a major component of their net worth. Thus, above and beyond the rationale of avoiding bubbles that entail risks of systemic financial distress and of tilting the economy into recession when they burst, our analysis highlights the extra social-welfare costs associated with burst housing bubbles, in that major costs of adjustment -- lost jobs, declining wealth, and distressed balance sheets -- fall differentially on people whose economic lives and material living standards are anyway less secure. To be sure, several elements of the present housing-price bust are unusual and unlikely to be repeated (notably, the extraordinary relaxation of lending standards associated with subprime mortgages). Yet other cases when booms and busts in home prices have had widespread effects are not difficult to find, notably, the 'credit crunch' that followed the 1980s real-estate booms on both coasts and contributed to the 1990-91 recession (Bernanke and Loan 1991).[19] The present paper underlines the importance of trying to 'lean against' housing price bubbles before they fully inflate and burst, whether by raising interest rates (Taylor 2007), increasing capital requirements, or some other means (Brunnermeier, Crockett, Goodhart, Persaud, and Shin 2009; Farmer 2010).

[19] See also Coleman, LaCour-Little, and Vandell (2008), for evidence that subprime lending was more a product of the housing-price bubble than it was its underlying cause.

Figure 1. Distribution of housing price gains and losses across metropolitan areas, 1998-2009



Source: Federal Home Financing Agency.

Table 1. Categorization of bubble vs. other metropolitan statistical areas

	# of MSAs	Share of metro U.S. population	Changes in FHFA home price index, 1998-2009				Average # of sample households per survey year
			% increase from 1998:q4 to peak		% drop from peak through 2009:q4		
			Mean	Median	Mean	Median	
Bubble MSAs	37	22.5	162.8	163.8	-38.8	-37.9	184,286
Other	247	77.5	64.3	55.3	-6.7	-4.3	659,751

Note: A metropolitan area is classified as having had a housing-price bubble if the FHFA home price index rose by 100% or more from 1998:Q4 through the peak for the series, and fell by more than 25% thereafter. See Appendix Table 1 for MSAs categorized as having bubbles.

Table 2. Variable definitions and descriptive statistics		
Variable	Definition	Unweighted mean
Person-level		
Less than HS diploma	=1 if person has not received a high school diploma, via regular graduation or GED; 0 otherwise	0.135
HS diploma	=1 if person has completed a high school diploma, via regular graduation or GED; 0 otherwise. Includes those who attended some college but did not obtain a bachelor's degree and those who have earned a two-year degree.	0.562
College degree	=1 if person has completed a bachelor's degree; 0 otherwise. Includes those who obtained higher degrees.	0.302
Employment	=1 if person has a job; 0 otherwise (sample confined to labor-force participants: those who had a job or actively sought work in the past 4 weeks)	0.936
Sectors of employment	=1 if person is employed in a given sector, based on U.S. Census Bureau's 1990 industry classification scheme; 0 otherwise	
	Construction	0.064
	Finance, insurance, real estate	0.073
	Consumer goods (food, beverages, apparel, drugs, cosmetics, printed materials, motor vehicles, furniture, appliances, fixtures, upholstery, electronics, etc.)	0.033
	Consumer services (retail, restaurants, air travel, hotel/motel, movie theatres, hair care, telecommunications, gas stations, parking, repair shops, dry cleaning, household work, landscaping, etc.)	0.196
Household-level		
Homeownership	=1 if home is owned or being bought; 0 otherwise. Includes all types of dwellings (single-family detached or attached, townhouses, mobile homes, apartments, etc.).	0.711
Home value	Respondent's estimate of the property's current market value ["About how much do you think this house and lot, apartment, or mobile home (and lot, if owned) would sell for it were for sale?"]. Expressed in log of current-year dollars.	12.244
Monthly housing costs	For homeowners, housing costs are "selected monthly owner costs", including payments for mortgages, deeds of trust, contracts to purchase, or similar debts on the property; real estate taxes; fire, hazard, and flood insurance; utilities (electric, gas, water, and sewer); fuels (such as oil, coal, kerosene, or wood), and condo fees or mobile home costs. For renters, housing costs are "gross rent," which is the contract rent plus the estimated average monthly cost of utilities and fuels if these are paid by the renter. Expressed in constant 2009 dollars, adjusted using the chained CPI for all urban consumers.	1346
High housing costs relative to income	= 1 if household's housing costs exceeded 40% of its income; 0 otherwise. Monthly costs are multiplied by 12 and divided by the household's income in the previous 12 months.	0.209

Table 3. Changes in employment probabilities, 2006-09

	Bubble metros	Other metros	Diff. Bubble-other
All labor force participants	-5.6* (0.3)	-3.2* (0.2)	-2.4* (0.4)
By education			
Below HS	-7.4* (0.9)	-5.2* (0.6)	-2.2* (1.1)
HS diploma	-6.4* (0.3)	-3.8* (0.2)	-2.6* (0.4)
College degree	-2.9* (0.1)	-1.8* (0.1)	-1.1* (0.1)
Differences			
Below HS – college	-4.5* (0.9)	-3.4* (0.6)	-1.1 (1.1)
HS diploma – college	-3.5* (0.3)	-2.0* (0.2)	-1.5* (0.4)

Notes: Sample is labor-force participants (people with jobs and unemployed people who had actively sought work within the past 4 weeks). n= 5,146,599

Table 4. Change in probability of employment in construction

	Bubble metros	Other metros	Diff. Bubble – other
All labor-force participants	-2.5*(0.5)	-1.1* (0.1)	-1.4* (0.5)
By education			
Below HS	-5.0* (1.5)	-2.4* (0.3)	-2.6+ (1.5)
HS diploma	-2.7* (0.4)	-1.2* (0.1)	-1.5* (0.4)
College degree	-0.7* (0.2)	-0.3 (0.2)	-0.4* (0.2)
Differences			
Below HS – college	-4.4* (1.3)	-2.2* (0.3)	-2.2* (1.3)
HS diploma – college	-2.0* (0.3)	-0.9* (0.1)	-1.2* (0.3)

See Table 3 for notes.

Table 5. Change in probability of employment in finance, real estate, or insurance

	Bubble metros	Other metros	Diff. Bubble-other
All labor force participants	-1.3* (0.1)	-0.7* (0.1)	-0.7* (0.1)
By education			
Below HS	-0.3* (0.1)	-0.5* (0.1)	0.1 (0.1)
HS diploma	-1.6* (0.1)	-0.8* (0.1)	-0.7* (0.2)
College degree	-1.4* (0.2)	-0.6* (0.2)	-0.8* (0.2)
Differences			
Below HS – college	1.1* (0.2)	0.1 (0.2)	1.0* (0.3)
HS diploma – college	-0.1 (0.2)	-0.2 (0.2)	0.1 (0.3)

See Table 3 for notes.

Table 6. Changes in probabilities of employment: Sectors producing consumer goods and services

	Consumer goods & services			Consumer goods			Consumer services		
	Bubble metros	Other metros	Diff. Bubble-other	Bubble metros	Other metros	Diff. Bubble-other	Bubble metros	Other metros	Diff. Bubble-other
All labor-force participants	-1.0* (0.2)	-0.7* (0.1)	-0.3 (0.2)	-0.4* (0.1)	-0.6* (0.1)	0.2* (0.1)	-0.6* (0.2)	-0.1 (0.1)	-0.5* (0.2)
By education									
Below HS	-0.5 (0.4)	-0.1 (0.4)	-0.5 (0.6)	-0.5* (0.1)	-0.8* (0.2)	0.4 (0.2)	-0.1 (0.4)	0.7+ (0.4)	-0.8 (0.6)
HS diploma	-1.0* (0.3)	-0.6* (0.2)	-0.4 (0.3)	-0.4* (0.1)	-0.7* (0.1)	0.3* (0.1)	-0.6* (0.3)	0.1 (0.1)	-0.7* (0.3)
College degree	-0.8* (0.3)	-0.4 (0.3)	-0.4 (0.3)	-0.1 (0.1)	-0.3* (0.1)	0.2 (0.1)	-0.7* (0.2)	-0.1 (0.2)	-0.6* (0.2)
Differences									
Below HS – college	0.3 (0.5)	0.3 (0.4)	0.0 (0.6)	-0.3 (0.2)	-0.5* (0.2)	0.2 (0.3)	0.6 (0.4)	0.8+ (0.4)	-0.2 (0.6)
HS diploma – college	-0.2 (0.4)	-0.2 (0.2)	0.0 (0.4)	-0.3* (0.1)	-0.4* (0.1)	0.1 (0.2)	0.1 (0.3)	0.2 (0.2)	-0.1 (0.3)

See Table 3 for notes.

Table 7. Housing wealth

	Change in homeownership rate (percentage points)			% change in average home value (among households owning their own home)		
	Bubble metros	Other metros	Diff. Bubble-other	Bubble metros	Other metros	Diff. Bubble-other
All households	-2.0* (0.2)	-1.4* (0.1)	-0.6* (0.2)	-35.2* (2.3)	-4.0* (1.4)	-31.1* (2.7)
By education of householder						
Below HS	-2.9* (0.5)	-3.3* (0.3)	0.4 (0.6)	-40.1* (3.5)	-5.3* (1.8)	-34.8* (3.9)
HS diploma	-2.5* (0.3)	-1.6* (0.2)	-0.8* (0.3)	-38.4* (2.2)	-5.6* (1.5)	-32.8* (2.6)
College degree	-1.4* (0.4)	-1.2* (0.2)	-0.2 (0.4)	-31.1* (2.3)	-5.4* (1.2)	-25.7* (2.6)
Differences						
Below HS – college	-1.5* (0.7)	-2.1* (0.3)	0.6 (0.8)	-9.0* (2.5)	0.1 (1.2)	-9.0* (2.7)
HS diploma – college	-1.1* (0.5)	-0.5* (0.2)	-0.6 (0.5)	-7.3* (1.3)	-0.2 (0.7)	-7.0* (1.4)

Note: The total number of households is 4,220,188. The number of home-owning households is 2,999,238.

Table 8. Change in housing costs, 2006-09 and 2008-09

	% change in real monthly housing costs			Change in probability of having housing costs > 40% of income (percentage pt. change)		
	Bubble metros	Other metros	Diff. Bubble-other	Bubble metros	Other metros	Diff. Bubble-other
2006-09						
All households	16.2* (0.5)	15.0* (0.5)	1.3+ (0.7)	1.8* (0.4)	0.7* (0.2)	1.1* (0.4)
By tenure						
Homeowners	16.6* (0.6)	14.7* (0.5)	1.9* (0.8)	1.6* (0.4)	0.2 (0.2)	1.4* (0.4)
Renters	16.9* (0.7)	17.0* (0.4)	-0.1 (0.8)	1.5* (0.4)	1.1* (0.3)	0.4 (0.5)
Diff. renters-owners	0.3 (1.0)	2.3* (0.5)	-2.0+ (1.1)	0.0 (0.4)	0.9* (0.3)	-1.0* (0.4)
2008-09						
All households	-4.1* (0.4)	-3.0* (0.3)	-1.1* (0.5)	-1.1* (0.2)	-0.2* (0.1)	-0.9* (0.3)
By tenure						
Homeowners	-4.9* (0.5)	-3.7* (0.3)	-1.1+ (0.6)	-1.8* (0.2)	-0.9* (0.1)	-0.9* (0.3)
Renters	-2.2* (0.5)	-0.6* (0.3)	-1.7* (0.5)	-0.3 (0.4)	0.7* (0.2)	-1.0* (0.4)
Diff. renters-owners	2.7* (0.6)	3.2* (0.3)	-0.5 (0.7)	1.5* (0.4)	1.6* (0.2)	-0.1 (0.4)

Note: n=4,220,188. See Table 2 for definition of housing costs.

REFERENCES

Baker, Dean, and David Rosnick. 2008. The Impact of the Housing Crash on Family Wealth. Center for Economic and Policy Research (Washington, DC), CEPR Reports and Issue Briefs.

Bernheim, B. Douglas and John Karl Scholz. 1993. Private Saving and Public Policy. In James Poterba, ed., *Tax Policy and the Economy*, Vol. 7. Cambridge, MA: MIT Press, 73-110.

Bernanke, Ben and Mark Gertler. 2001. Should Central Banks Respond to Movements in Asset Prices? *American Economic Review* 91(2), 253-257.

_____ and Cara Lown. 1991. The Credit Crunch. *Brookings Papers on Economic Activity* 2: 204-39.

Bertaut, Carol and Martha Starr-McCluer. 2000. Household Portfolios in the United States. In *Household Portfolios*, eds. Luigi Guiso, Michael Haliassos, and Tullio Jappelli, 181-218. Cambridge: MIT Press.

Blank, Rebecca M. 1989. Disaggregating the Effect of the Business Cycle on the Distribution of Income. *Economica* 56(2), 141-163.

Blau, Francine D and John W. Graham. 1990. Black-White Differences in Wealth and Asset Composition. *Quarterly Journal of Economics* 105(2), 321-39.

Bostic, Raphael, Stuart Gabriel, and Gary Painter. 2009. Housing Wealth, Financial Wealth, and Consumption: New Evidence from Micro Data *Regional Science and Urban Economics* 39(1), 79-89.

Brunnermeier, Marcus, Andrew Crockett, Charles Goodhart, Avinash Persaud and Hyun Shin. 2009. Fundamental Principles of Financial Regulation. International Center for Monetary and Banking Studies, Geneva Report on the World Economy, No.11 (January).

Carroll, Christopher D., Misuzu Otsuka, Jirka Slacalek. 2006. How Large Is the Housing Wealth Effect? A New Approach. NBER Working Paper No. 12746.

Case, Karl E. and Leah Cook. 1989. The Distributional Effects of Housing Price Booms: Winners and Losers in Boston, 1980-88. *New England Economic Review* May, 3–12.

_____ and John Quigley. 2008. How Housing Booms Unwind: Income Effects, Wealth Effects, and Feedbacks through Financial Markets. *European Journal of Housing Policy* 8(2), 161–180.

_____ and Robert J. Shiller. 2003. Is There a Bubble in the Housing Market? *Brookings Papers on Economic Activity* 2, 299-362

_____. 2005. Comparing Wealth Effects: The Stock Market versus the Housing Market. *Advances in Macroeconomics* 5(1), 1–32.

Coleman, Major, Michael LaCour-Little, Kerry D. Vandell. 2008. Subprime Lending and the Housing Bubble: Tail Wags Dog? *Journal of Housing Economics* 17(4), 272-90.

Del Negro, Marco and Christopher Otrok. 2007. 99 Luftballons: Monetary policy and the house price boom across U.S. states. *Journal of Monetary Economics* 54(7), 1962-85.

Elsby, Michael, Bart Hobijn, and Ayşegül Şahin. 2010. The Labor Market in the Great Recession. *Brookings Papers on Economic Activity* 1, 1-48.

Fair, Ray. 2004. *Estimating How the Macroeconomy Works*. Cambridge, MA: Harvard University Press.

Farmer, Roger. 2010. *Expectations, Employment and Prices*. Oxford, UK: Oxford University Press.

Ferreira, Fernando, Joseph Gyourko, and Joseph Tracy. 2008. Housing Busts and Household Mobility. NBER Working Paper No. 14310.

Fu, Dong. 2007. National, regional and metro-specific factors of the U.S. housing market. Federal Reserve Bank of Dallas Working Paper No. 0707.

Genesove, David. 2003. The Nominal Rigidity of Apartment Rents. *Review of Economics and Statistics* 85(4), 844-853.

Glaeser, Edward L., Joseph Gyourko, and Albert Saiz. 2008. Housing supply and housing bubbles. *Journal of Urban Economics* 64(2), 198-217.

Goodman, Allen C.' and Thomas G. Thibodeau. 2008. Where are the Speculative Bubbles in U.S. Housing Markets? *Journal of Housing Economics* 17(2), 117-137.

Goodman, John L. and John B. Ittner. 1992. The accuracy of home owners' estimates of house value. *Journal of Housing Economics* 2(4), 339-357.

Gramlich, Edward. 1974. The Distributional Effects *of* Higher Unemployment. *Brookings Papers on Economic Activity* 2, 293-336

_____. 2007. *Subprime Mortgages: America's Latest Boom and Bust*. Washington, DC: Urban Institute Press.

Gürkaynak, Refet. 2008. Econometric tests of asset price bubbles: Taking stock. *Journal of Economic Surveys* 22(1), 166–186.

Himmelberg, Charles, Christopher Mayer, and Todd Sinai. 2005. Assessing High House Prices: Bubbles, Fundamentals and Misperceptions. *Journal of Economic Perspectives* 19(4), 67-92.

Hoynes, Hilary W. 2000. The Employment, Earnings, and Income of Less Skilled Workers over the Business Cycle. In *Finding jobs: Work and welfare reform*, eds. David Card and Rebecca Blank, 23-71. New York, NY: Russell Sage Foundation.

Hsieh, Chang-Tai, and Enrico Moretti. 2003. Can Free Entry Be Inefficient? Fixed Commissions and Social Waste in the Real Estate Industry. *Journal of Political Economy* 111(5), 1076-1122.

Iacoviello, Matteo (2010). "Housing wealth and consumption." Boston College Working Paper (June 13). Accessed electronically at: https://www2.bc.edu/~iacoviel/research_files/HWAC.pdf

Kohn, Donald L. 2006. Monetary Policy and Asset Prices. Speech at a colloquium on "Monetary Policy: A Journey from Theory to Practice," held in Frankfurt at the European Central Bank (March).

Leamer, Edward E. 2007. Housing IS the Business Cycle. NBER Working Paper No. 13428.

Mayer, Christopher and Karen Pence. 2008. Subprime Mortgages: What, Where, and to Whom? NBER Working Paper No. 14083.

Muellbauer, John. 2008. Housing, Credit and Consumer Expenditure. Centre for Economic Policy Research (London), Discussion Paper No. 6782.

Office of Federal Housing Enterprise Oversight (2008). “Revisiting the Differences between the OFHEO and S&P/Case-Shiller House Price Indexes: New Explanations.” Working paper (January), available at <http://www.fhfa.gov/webfiles/1163/OFHEOSPCS12008.pdf

Ruggles, Stephen, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. 2010. *Integrated Public Use Microdata Series: Version 5.0* [Machine-readable database]. Minneapolis: University of Minnesota.

Stock, James and Mark Watson. 1999. Business Cycle Fluctuations in US Macroeconomic Time Series. In *Handbook of Macroeconomics*, eds. John Taylor and Michael Woodford, 3–64. Amsterdam: Elsevier/North-Holland.

U.S. Census Bureau. 2009. Design and Methodology: American Community Survey. Washington, DC: U.S. Government Printing Office.

Wial, Howard and Richard Shearer. 2010. Tracking economic recession and recovery in America’s 100 largest metropolitan areas. *Brookings Institution Metro Monitor* (Dec.).

APPENDIX.

Table A1. Metropolitan areas with severe housing bubbles

	% increase from 1998:q4 to peak	% drop from peak to 2009:q4
Naples, FL	206.7	-48.5
Salinas-Sea Side-Monterey, CA	201.4	-47.1
Merced, CA	196.5	-57.9
Miami-Hialeah, FL	194.8	-37.9
Riverside-San Bernardino, CA	189.5	-44.0
Fort Lauderdale-Hollywood-Pompano Beach, FL	188.3	-41.6
Modesto, CA	186.0	-53.2
Los Angeles-Long Beach, CA	185.2	-28.4
Santa Barbara-Santa Maria-Lompoc, CA	183.3	-34.4
West Palm Beach-Boca Raton-Delray Beach, FL	178.8	-39.4
Stockton, CA	177.2	-54.1
San Luis Obispo-Atascad-P Robles, CA	174.2	-25.8
Ventura-Oxnard-Simi Valley, CA	173.4	-30.9
Fort Myers-Cape Coral, FL	169.4	-50.2
San Diego, CA	169.2	-28.8
Fresno, CA	167.9	-38.2
Yuba City, CA	167.5	-43.8
Bakersfield, CA	165.6	-43.0
Sacramento, CA	163.8	-37.8
Yolo, CA	163.8	-37.8
Fort Pierce, FL	163.4	-47.3
Sarasota, FL	159.2	-41.6
Santa Rosa-Petaluma, CA	156.8	-32.3
Daytona Beach, FL	155.1	-36.9
Punta Gorda, FL	154.4	-42.6
Melbourne-Titusville-Cocoa-Palm Bay, FL	152.0	-40.7
Redding, CA	146.9	-27.7
Tampa-St. Petersburg-Clearwater, FL	145.9	-32.1
Santa Cruz, CA	145.5	-25.2
Orlando, FL	144.5	-34.9
Phoenix, AZ	135.1	-37.0
Visalia-Tulare-Porterville, CA	134.8	-37.8
Medford, OR	128.8	-27.1
Las Vegas, NV	127.9	-50.3
Ocala, FL	126.9	-29.8
Reno, NV	123.7	-39.6
Lakeland-Winterhaven, FL	119.2	-31.0

Table A2. Employment probabilities (among labor force participants)										
	Bubble metros					Other metros				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Total employment										
All educations	93.7	94.4	93.9	92.9	88.8	93.3	94.0	94.1	94.2	90.8
Below HS	89.2	90.5	90.4	88.6	83.1	85.6	87.3	87.4	87.8	82.1
HS diploma	93.5	94.2	93.5	92.4	87.8	92.8	93.3	93.5	93.5	89.5
College degree	96.7	96.9	96.7	96.5	94.0	96.8	97.1	97.2	97.2	95.3
Construction										
All educations	8.7	9.0	8.6	7.7	6.5	6.7	7.0	6.9	6.6	5.9
Below HS	16.6	16.9	16.2	14.5	11.9	14.8	15.6	15.6	14.9	13.2
HS diploma	9.1	9.6	9.3	8.1	6.9	7.7	8.0	8.0	7.6	6.8
College degree	3.3	3.3	3.2	3.1	2.6	2.4	2.5	2.5	2.6	2.3
FIRE										
All educations	7.2	7.4	7.2	6.5	6.0	7.2	7.3	7.3	7.0	6.7
Below HS	1.9	1.9	1.8	1.7	1.6	2.0	2.1	1.8	2.0	1.6
HS diploma	7.5	7.5	7.2	6.5	5.9	6.5	6.6	6.4	6.2	5.8
College degree	9.6	10.1	10.0	9.3	8.6	10.0	10.2	10.3	9.7	9.6
Consumer goods										
All educations	2.9	2.9	2.7	2.6	2.5	3.6	3.6	3.5	3.3	3.0
Below HS	5.3	5.2	5.2	4.9	4.8	4.7	5.0	4.7	4.7	4.2
HS diploma	2.5	2.5	2.3	2.2	2.0	3.6	3.6	3.4	3.3	2.9
College degree	2.4	2.4	2.3	2.2	2.3	3.2	3.2	3.1	3.1	2.9
Consumer services										
All educations	23.5	24.0	24.0	24.4	23.4	20.1	20.1	20.2	20.4	20.0
Below HS	29.6	30.2	31.2	31.4	30.1	27.4	28.2	28.5	29.4	28.9
HS diploma	26.3	26.8	26.7	27.0	26.2	23.4	23.6	23.8	23.9	23.6
College degree	14.0	14.7	14.4	14.9	14.0	11.9	11.5	11.7	11.8	11.4

Table A3. Homeownership and home values										
	Bubble metros					Other metros				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Homeownership										
All households	63.0	63.4	63.1	62.2	61.3	65.5	66.0	66.0	65.6	64.6
By education										
Below HS	48.1	48.4	48.2	46.5	45.5	51.1	51.7	50.7	49.0	48.4
HS	61.9	62.3	61.7	60.9	59.8	63.6	63.9	63.7	63.4	62.2
College	73.6	73.2	73.2	72.6	71.8	74.8	75.3	75.6	75.0	74.1
Average home value (‘000 current US$)										
All households	383.8	429.1	427.7	374.4	323.2	250.4	269.3	278.9	269.2	256.1
By education										
Below HS	269.8	314.6	318.0	273.4	218.3	160.3	170.5	178.7	176.6	163.9
HS	340.6	385.5	382.5	329.1	277.8	207.2	223.6	231.3	222.6	210.3
College	497.3	538.5	534.5	476.3	424.6	339.7	361.5	369.9	355.0	339.3

Table A4. Housing costs for owners and renters										
	Bubble metros					Other metros				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Real monthly housing costs (constant ‘09 $)										
All households	1400	1531	1593	1622	1542	1228	1289	1305	1348	1302
By tenure										
Owners	1585	1761	1846	1877	1775	1393	1472	1495	1544	1485
Renters	1072	1120	1144	1188	1160	899	918	917	958	953
Share of HHs w/housing costs > 40% of income										
All households	25.7	28.1	28.8	31.0	29.9	20.4	21.3	20.8	22.2	22.0
By tenure										
Owners	20.6	23.9	25.6	27.2	25.4	14.9	16.3	16.1	17.4	16.5
Renters	34.5	35.4	34.4	37.3	36.9	31.1	31.1	30.1	31.5	32.2