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ABSTRACT

The boom and bust in housing during the 2000s has led to renewed interest in the boom and bust in housing between 1920 and 1940. The most commonly used housing value series for this period is reported by Robert Shiller in Irrational Exuberance. We investigate the changes in housing values in cities between 1920 and 1940 using a variety of alternative sources with many more cities available for comparison than in the Shiller series. We find that all nominal housing value series show a strong decline between the late 1920s and the early 1930s. However, all of the series except the Shiller series imply that housing values in 1920 were well below the 1930 value and thus imply much stronger growth rates in housing values during the 1920s housing boom. Only the Shiller series predicts a strong recovery in housing values to within 5 percent of the 1930 level. All of the others suggest that nominal housing values in 1940 remained at least 18 percent below the 1930 values and several series suggest that values lurched downward between 1933 and 1940. The results suggest that a significant reconsideration of the operation of housing markets in the 1920s and 1930s is required.

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New Multi-City Estimates of the Changes in Home Values, 1920-1940

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The boom and bust in housing during the 2000s has led to renewed interest in the boom and bust in housing between 1920 and 1940. Unfortunately, current multi-city estimates of the changes in nominal housing values for the period are based on series designed for long run comparisons. Leo Grebler, David Blank, and Louis Winnick (GBW, 1956, 342-356) created two series, one adjusted for depreciation and another unadjusted, that covered 22 cities from 1890 through 1934. They created the series as a robustness check for their estimates of building costs over time. Both series have received a great deal of attention because they are reported in the past two *Historical Statistics of the United States*.[1] In *Irrational Exuberance* Robert Shiller (2006, 2009) extended the series to 1953 by splicing a time series of average asking prices in 5 major cities onto the unadjusted GBW series. This Shiller-GBW Hybrid series is now widely cited in papers, in the press, and on the internet because it is combined with the modern Case-Shiller/S&P Repeat Sales Price Index to create a continuous series from 1890 to the present.

Because the series are meant to both provide annual estimates and to be consistent across long time periods, the scholars creating them did not use a great deal of information that is available from other sources for specific time periods. Currently, the two GBW series suggest conflicting stories about the path of nominal housing values during the 1920s housing boom. The unadjusted series combined into the Shiller-GBW Hybrid has housing values in 1920 that were 7.3 percent *higher* than in 1920, while the adjusted series has values that were 6.5 percent *lower*; therefore, they describe drastically different pictures of growth rates in nominal housing prices during the 1920s. During the New Deal period from 1934 to 1940, we have only the one

[1]See U.S. Bureau of the Census (1975, series 259 and 260, p. 647) and Snowden (2006, series Dc826 and DC827, p. 4-515).

multi-city series used in the Shiller-GBW Hybrid series. It suggests a very strong recovery of housing values to 95 percent of the level seen in 1930. Recent hedonic price indices created for Manhattan by Tom Nicholas and Anna Scherbina (2010) raise some doubt about that figure because they find housing values that are roughly 70 percent of the 1930 level and New York City is among the 5 cities in the Shiller-GBW Hybrid.

We investigate the changes in housing values in cities between 1920 and 1940 using a variety of alternative sources: the mortgage census of 1920, the family census of 1930, the housing census of 1940, HOLC surveys of real estate professionals, results of housing inventories performed under New Deal works projects for over 100 cities, and archival information from the financial housing surveys performed by the Civil Works Administration and used by GBW that allows us to more than double the number of cities in the GBW index. We compare the new estimates to the BLS estimates of the rent CPI and the values of building permits per family taken care of, for further robustness checks.

We find that all nominal housing value series show a strong decline between the late 1920s and the early 1930s. However, there are sharp differences between the Shiller-GBW hybrid and the rest of the series circa 1920 and 1940. All of the series except the Shiller-GBW hybrid imply that housing values in 1920 were well below the 1930 value and thus imply much stronger growth rates in housing values during the 1920s housing boom. Only the Shiller-GBW hybrid predicts a strong recovery in housing values to within 5 percent of the 1930 level. All of the others suggest that nominal housing values in 1940 remained at least 18 percent below the 1930 values and several series suggest that values lurched downward between 1933 and 1940.

In addition, we compare the boom and bust in housing values in the 2000s with the 1920-1940 period, showing changes in nominal housing values, housing values adjusted for CPI inflation, and housing values relative to income. In all comparisons, the rise in housing prices during the 2000s was dramatically more rapid than in the 1920s boom. After 2007 the nominal and inflation-adjusted national median values reported by all home owners fell sharply but not to year 2000 levels. However, nominal and real sales price indices suggest that actual sale prices have fallen back to the 2000 level.

The comparisons of the busts after the peak during the Depression are much more complicated because of the major deflation between 1929 and 1933 and the huge drop in per capita incomes during that period. Both the nominal and inflation-adjusted series show that housing values reported by all home owners had fallen below their 1922 levels by 1940. If the experience in the Depression is repeated over the next few years, and that is a big if, home owners face the scary prospect that nominal and real home values might well continue to fall to levels well below the 2000 level. On the other hand, the affordability of housing rose sharply in both periods as housing prices fell and incomes grew.

I. The Existing Multi-City Estimates

Currently there are two multi-city time series that are being used to describe how home prices and housing values changed between 1920 and 1940. The coverage is limited and the focus of the series is on developing consistent annual series that run from 1890 to the present. The estimates that are getting the most attention come from a time series reported by Robert Shiller (2005) in *Rational Exuberance*. Between 1920 and 1940 the series splices together two time series: a series of home prices unadjusted for depreciation reported by Grebler, Blank, and

Winnick for 1890 through 1934 and a series of median home asking prices for 1935 through 1953.

For the period from 1890 through 1934 Grebler, Blank, and Winnick (1956, 342-356) used information for 22 cities from Wickens (1937, Table 3 for each city). The information comes from a series of surveys conducted by the Civil Works Administration in the winter of 1934 in 64 cities.[2] Each home owner was asked the original cost of the home in the year the home was purchased as well as the owner's assessment of the current sale price he might anticipate receiving for the home. GBW then used this information to construct a set of home price indices for single family homes for each of the cities and then aggregated them. They provided a raw set of estimates and then reported a set of estimates that took into account an annual compound depreciation rate of 1 3/8 percent in the homes that they based on a careful analysis of other data (GBW, Appendix E). Their discussion suggests that they felt that the adjusted estimates were more accurate. They showed that their unadjusted estimates for Cleveland and Seattle showed a much smaller rise in prices in the 1920s than three-year moving averages of prices paid for newly constructed 1-family homes developed by Frank Garfield and William Hoad for the same cities.[3] This finding was consistent with their expectation that the unadjusted series biased downward the home price rise.

[2] The surveys were conducted in two ways, by visits from personal enumerators and a survey handed out and then returned by mail. "A house-to-house canvas was made of all occupied residential properties within the boundaries of every tenth block in larger cities and every seventh block within smaller cities. Where necessary to insure sampling of all important areas, additional blocks, chosen by informed local agencies, were also covered by the enumerators." Surveys for a separate sample were distributed and to be returned by mail to four out of every nine remaining blocks. The combined totals of returned surveys covered about 15 percent of all families in the cities included in the survey. Wickens 1937, xv-xvi.

[3] Garfield and Hoad (1937) used the underlying information from the CWA surveys of Cleveland and Seattle that allowed them to focus on newly constructed costs of purchase of 1-family wood homes with 5 or 6 rooms.

In a sense the GBW indices are similar to a repeat sale price index because the owners reported their estimated 1934 sale value and the price they paid in the year they purchased the home. Shiller likely chose the unadjusted GBW index because it is most like the repeat sales index that he and Karl Case have developed for the modern period. The argument for the repeat sales index is that quality is held constant because the same house is being evaluated in the earlier and later period. However, if the service quality of the home is depreciating with wear and tear over time, the home being evaluated in 1934 is of lower quality relative to the home when it was first purchased. The diminution of quality is greater the longer the gap between the date of purchase and the time of evaluation in 1934. Had the home kept the same quality over time, its value in 1934 would have been higher than a depreciated home in 1934, and therefore, if the price index is not adjusted for depreciation, the growth in prices for homes of the same quality will be underestimated. This problem led GBW to create the second index adjusted for depreciation.[4]

Since the GBW index ended in 1934, Shiller spliced in new information for the years 1935 through 1953. Shiller (2006, 269-70) reports that the home price index for 1934 through 1953 is a simple average over 5 cities of median home asking prices advertised in newspapers for Chicago, Los Angeles, New Orleans, New York, and Washington, D.C. For all but Washington, D.C. students used microfilmed newspapers from the Yale University Library and collected "approximately thirty prices for each city and year." The information for Washington, D.C. for 1934-48 data came from a median asking price series collected by E. M. Fisher (1951), which is also reported separately as series Dc828 in the *Millennial Historical Statistics* (Snowden 2006, 4-

[4]The indices also suffer from measurement error that likely arises because in many cities the purchase date for roughly half the homes was more than a decade earlier and it relied on the home owner having an accurate impression of the selling price of the home in 1934, a year in which very few homes were selling.

515). Shiller notes that "the median series does not make any attempt to correct for home quality change," unlike the modern series that he and Karl Case developed. "Improvements in home size and quality gives median home prices an upward bias, and this is why [he] avoided using median prices outside the 1934-53 interval."

Figure 1 shows the paths followed by the Grebler, Blank, and Winnick (GBW) adjusted series and the Shiller-GBW hybrid series Washington, D.C. Figure 1 also includes three additional series for comparison. The first two are the average value of residential building permits per family taken care of for 257 cities: 1) all types of housing and 2) one-family houses. This is a rough estimate of what builders considered a likely value added of new housing, a key component of the overall value of the home with the value of the lot included. The third is the rent portion of the Urban Consumer Price Index, which shows how rents paid by tenants moved over time in 32 cities. Rents generally tend to move in the same direction as housing values; of the 394 counties with over 50,000 people in 1930, less than 1 percent experienced a change in median rents between 1930 and 1940 that moved in the opposite direction of the change in median home values, while the correlation weighted by population was 0.36. All series are indexed so that the 1930 value equals 100.[5]

All the series show a peak in values sometime in the mid to late 1920s The average permit value series both peak around 1929 and 1930, while the Shiller-GBW Hybrid, the GBW Adjusted and the Rent CPI reach peaks in 1925, ranging from 6.2 to 13.7 percent higher than the

[5]Both measures of the average value of building permits per family provided for come from U.S. Bureau of Labor (1941b, 16) and then were indexed so that the 1930 value equals 100. Measures were provided for one-family units and for multi-family units. The CPI rent index is from U.S. Bureau of Labor (1941a) and adjusted so that the 1930 value equaled 100.

1930 price. One potential reason for the difference in the timing of the peak for permit values and for the remaining series is that the permit values likely do not incorporate the value of the lot on which the building is located. All five series hit troughs between 1933 and 1935 that are about 19.4 to 26.7 percent below the 1930 price.

On the other hand, there are distinct differences at the 1920 and 1940 endpoints. By using the unadjusted GBW series, the Shiller-GBW hybrid shows that housing prices in 1920 were 7.3 percent *higher* in 1920 than in 1930 while all of the other series on the graph suggest that housing prices and rents were 6.5 to 20 percent *lower* than in 1920 or 1921 than in 1930.

The Shiller-GBW hybrid index also leads to much higher estimates of the recovery to 1940 in home prices than the other series, as it reaches 95 percent of the 1930 value, 21 percent above the trough in 1933. In contrast, the rent CPI and the average values of building permits in 1940 were at most 82 percent of their 1930 value.

II. Single-City Indices

As might be expected, the multi-city indices disguise a great deal of variance in the experiences across the country. Figure 2 plots the Shiller-GBW hybrid and the GBW adjusted indices against the Garfield-Hoad indices for prices of new single-family homes in Cleveland and Seattle, two of the 22 cities underlying the GBW indices up to 1934. The Fisher asking price series for Washington, D.C., and a new hedonic price index series for Manhattan created by Tom Nicholas and Anna Scherbina are added since Washington and New York City were two of the 5 cities used by Shiller to create the hybrid index after 1934.[6] All of the series peak sometime

[6] Tom Nicholas and Anna Scherbina (2010) created a price index for real estate transactions for Manhattan between 1920 and 1939. For each month they collected 30 prices from real estate transactions and ran a pooled hedonic regression and employed time dummies to capture the change in price adjusted for the features of the

during the 1920s although the timing varies such that Seattle peaks in 1924 and Manhattan in 1929 while the rest peak around 1925. They all hit troughs in the early 1930s, although the Manhattan series bounces upward in 1933 and 1934 before dropping again.

Once again, the series differ sharply at the 1920 and 1940 endpoints. The Shiller-GBW Hybrid and Manhattan indices are well above 100 in 1920 even though Manhattan is not among the cities in the Shiller-GBW hybrid until after 1934. The Cleveland, GBW adjusted, and Washington indices are all well below 100, although Washington is not among the cities in the Shiller-GBW hybrid index at that time. In 1939, the Manhattan index is well below the Shiller-GBW Hybrid and the Washington asking price index.

III. Alternative Estimates of Housing Values

The advantage of the series discussed above is that they have values each year over an extended period of time. However, they generally are very limited in the number of cities covered. To complement and potentially replace these series, we show the results of comparisons at key points in time during the period 1920 through 1940. We use two sets of data to examine the changes in home values over the period. The first set are based on reports by home owners of the sale value of their homes in the 1920, 1930, and 1940 censuses and in a series of surveys of the housing inventory undertaken by the Civil Works Administration and

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housing over time. Unlike the other series, the Manhattan series includes some commercial buildings and a number of multi-family tenements that included stores on the first floor. They control for these features with their hedonic regressions with dummy variables for the presence of a store on the first floor, although they do not provide separate estimates without these groups. As a contrast, in the estimates of home values used below, home owners were expected to provide values for only the residential part of the building if there was a store present.

The Cleveland and Seattle series were created by Garfield and Hoad (1937) used unpublished information for the CWA survey that Grebler, Blank, and Winnick used. They focused on new 1-family homes with 6 rooms and used the answers to the same questions about cost of homes at the time of purchase used by Grebler, Blank, and Winnick. Fisher (1956) collected asking prices for Washington, D.C. homes.

over 110 other cities during the mid-1930s. The second are based on reports by real estate agents to the Home Owners' Loan Corporation of the minimum and maximum sale values in all of the neighborhoods within over 100 cities of homes for key years between 1929 and 1939.

III.1 An Index for Average Home Values in 1920, 1930, 1933, 1934, and 1940

Constructing a consistent index for housing prices requires information reported on the same basis for the same types of homes and information reported for the same sets of geographic areas. We construct an index for home values for 1920, 1930, 1933, 1934, and 1940 from average values for nonfarm owner-occupied mortgaged homes using information from the 1920 and 1940 censuses and from the financial survey performed by the Civil Works Administration in 1934.

The 1920 Census performed a mail survey of mortgage holders as to the "market value of the home on January 1, 1920 (amount for which the home could be sold within a reasonable time)" and reported average values for 273 cities (U.S. Bureau of the Census 1923, 18,173-8).[7] The 1930 Census Report on Families reported median housing values and the distribution of

[7] As seen in the text, the while the Financial Housing Survey in 1934, and the 1930 and 1940 Censuses all explicitly stated in their instructions that the value of the lot (what the Census termed as real estate) was included in the value. The Mortgage Census volume (U.S. Bureau of the Census 1923) never explicitly makes the statements that the value of the lot is included, although statements throughout the text suggest that it is, and E.M. Fisher (1951, 51) later treats estimates of average values for 1920, 1930, and 1940 as comparable except for the fact that the 1920 estimates were mortgaged. Sales of homes and the mortgages for homes, particularly one-family homes, typically included the real estate beneath it, and the question in the survey asked about the value at which the home could be sold within a reasonable time. Statements in the text suggest that the writers believe the value of the lot (real estate) to be included in the average values. For example, in comparing differences in the rise in average values across cities between 1890 and 1920, the report stated that "the high average values in the rapidly growing cities were partly due to the expected rise in real estate values which has since taken place" (U.S. Bureau of Census 1923, 69). The statement referred to 1890 values, which the census compared directly with 1920 values in several tables without further comment. On p. 43 the Census reported that the average value of homes had not risen nearly as fast as the rise in real estate prices, building costs, and interest rate on other securities. They argued that this "seems to indicate that there has been an increase in the ownership of smaller homes," which would have come about because declines in the size of the home offset the rise in these other factors in determining the value. As can be seen below, the Census and the Financial Housing Surveys were more careful in their wording in the instructions. To the extent that respondents did not include the value of the lot in their sale value of the homes, a rise in values between 1920 and 1930 is overstated.

housing values for owner-occupied homes but did not specify the mortgage status or report average values, so the information is not directly comparable with the 1920 information. Fortunately, the Civil Works Administration in 1934 performed a financial housing survey in 64 cities spread across the country and reported information on the average value of mortgaged owner-occupied properties for 40 cities that overlap with the 273 cities from the 1920 Census. The CWA survey asked owners to provide an "estimated market value of the property" on January 1 of the years 1930, 1933, and 1934. Values were "understood as the estimated market values reported by the owners" and "not assessed valuations." The values also included the cost of the lot or site (Wickens 1937, pp. xxv, xxvi). We located hand-written summary tables for 61 of the 64 cities surveyed by the CWA at the National Archives Branch in Missouri in a group of boxes under an entry titled "Drugstore Survey, St. Louis, MO 1926-1927." The summary tables provided average values for owner-occupied properties, owner-occupied properties free of mortgage, and owner-occupied properties that were mortgaged.[8] Separate averages were reported in each category for single-families, as well. Wickens (1937) reported much of the information (but not all) from these hand-written tables for 22 of the cities. Grebler, Blank, and Winnick (1956, 344-358) then used information on the cost of the house at the time of purchase for those 22 cities to construct the housing price index that Shiller used for his home price series from 1890 through 1934. Wickens (1941) later reported some of the information on values for the original 22 and an additional 30 cities. Michael Brocker and Chris Hanes (2012) use this

[8] The tables were unnumbered but were titled Value and Debt Status of Urban Residential Property, by Type of Dwelling: Mortgaged Properties and Properties Free of Mortgage , and Owner Occupied with and without Rental Parts, January 1, 1930, 1933, and 1934. From that information we collected the information on all owner-occupied properties, owner-occupied properties that were mortgaged, and owner-occupied properties that were free of mortgage for each of the three years. We collected the same information for 1-family homes as well.

information for his analysis of the determinants of the rise in fall in housing values in this volume.[9]

The 1940 Census surveyed home owners as to their mortgage status and the "value of an owner-occupied home," which represented "the amount for which the dwelling unit, including the land as belongs with it, would sell under ordinary circumstances—not at forced sale. If the owner-occupied unit is in a structure that contains more than one dwelling unit, or if part of the structure is used for business purposes, only that portion occupied by the owner and his household" is considered (U.S. Bureau of the Census 1943, 4). Volume IV of the Housing Census on Mortgages reported the average value of properties for owner-occupied mortgaged 1-family properties for 185 cities with more than 100,000 people (U.S. Bureau of the Census 1943, Volume IV, Part 1, p. 80, 88-9). Volume II of the Housing Census also reported averages for all owner-occupied homes for all cities and towns in Tables 21 and 23 for each state (U.S. Bureau of the Census, 1943.

From this information we construct a spliced index for the average value of owner-occupied mortgaged homes (AVOOMS) with values of 100 for 1930 for the 40 cities for which information was reported in the sources covering 1920, 1930, 1933, 1934, and 1940. The AVOOMS index is created by splicing together two overlapping series with the 1930 value equal to 100: a series for the average value of owner-occupied mortgaged homes (AVOOM) for 1920, 1930, 1933, and 1934 and a series for the average value of 1-family mortgaged owner-occupied (AVOOM1F) for the years 1930, 1933, 1934, and 1940.

[9] Wickens (1937, xxvi and Tables 5 8, 31, 32, 33 for each city) reported values of owner-occupied properties and values of owner-occupied mortgaged properties for each of the 22 cities but did not include all of the detail found in the hand-written tables. Wickens (1941, Table A10) later reported information on average values of owner-occupied 1-family nonfarm homes for 50 cities, which included the 22 from the 1937 volume.

To develop the 1920 value of the index, we used city averages for owner-occupied mortgaged homes from the 1920 census and for 1930 from the CWA study. We calculated the ratio of the average value in 1920 (AV_{i20}) to the average value in 1930 (AV_{i30}) for each city i and then calculated a weighted average across cities using the number of families in owner-occupied homes in 1930 (N_{i30}) in each city as the weight.

$$\text{AVOOM Index}_{20} = (\Sigma\ (AV_{i20}/AV_{i30})*N_{i30}\ )/\Sigma\ N_{i30} * 100.$$

All other indices that were built up from individual cities are constructed with the same procedure. In the 1920-1940 period the number of owner-occupied homes in 1930 in each city is used as the weight. For the 2000s we use the number of owner-occupied homes in 2000 for each city as the weight.

Since the 1940 Census reported average values for owner-occupied mortgaged homes for only 1-family dwellings, we created a separate (AVOOM1F) index for 1930, 1933, 1934, and 1940 using the CWA information and the 1940 Census information for those types of homes. The AVOOM and AVOOM1F indices in Table 1 use information from 40 cities that have 715,328 owner-occupied homes in 1930. As shown in the bottom of table 1, the cities include 1 of the 10 largest cities, 14 of the top 50, 27 of the top 100, and 36 of the top 200. We developed the spliced AVOOMS by calculating the AVOOM/AVOOM1F ratio for 1930, 1933, and 1934 and then calculating the average of the three ratios. The AVOOM and AVOOM1F indices were so close together that the average ratio was 0.99957. We then multiplied the average ratio by the AVOOM1F values for 1933, 1934, and 1940 to get the spliced index for the average value of owner-occupied mortgaged homes (AVOOMS) in Table 1. The values underneath the index

values are standard deviations of the indexes across cities using the number of nonfarm homeowners as a frequency weight.

III.2 Comparisons of Indices for 1920 through 1934

The AVOOMS index in 1920 contrasts sharply with the Shiller-GBW Hybrid Index, while resembling more closely the rent CPI and the GBW adjusted index. The AVOOMS index in Table 1 rises from 86.1 in 1920 to 100 in 1930. This rise differs quite a bit from the decline from 107.3 to 100 in the Shiller-GBW Index, which is the unadjusted GBW index until 1934. Meanwhile, the rise is more consistent with the rises seen in Figure 1 from 87.8 to 100 by the CPI rent index, from 93.5 to 100 in the GBW Adjusted Index, from 90 to 100 in the average value of all residential permits and from 79 to 100 in the average value of single family building permits.

Between 1930 and 1934 all of the indexes show sharp drops in prices. The AVOOMS index falls to 82.5 in 1933 and then 79.3 in 1934. Meanwhile, both the Shiller-GBW Hybrid and the GBW unadjusted index fall to 79.1 and 81.4, because they are identical from 1920 through 1934. Note that the GBW index adjusted for depreciation falls to similar levels of 82.4 in 1933 and 80.6 in 1934 because the adjustments for depreciation diminish markedly as the series comes to an end in 1934. The CPI rent index falls even more than the other series to a low of 68.6 in 1934.

The relationships between the GBW adjusted and unadjusted indices and the AVOOMS index can be investigated further because the indices share 20 of the 22 cities used by the GBW indices. Casper, Wyoming and Reno, Nevada are the missing cities. We can also construct AVOOM1F and an index for the average value of owner occupied homes (AVOO) using all 22

cities from the GBW Index for the years 1930, 1933, and 1934. Grebler, Blank, and Winnick (1956, 344-358) developed their series as a check on the estimates of construction costs over a long period of time; therefore, they wanted to create a long time series that stretched back to 1890. With the information from the CWA surveys the only way to achieve this goal was to use the information that owners reported on the prices they paid for the homes at the time of purchase, which included homes that had been purchased in the 1890s. As a result, they did not make use of the value information reported by home owners for January 1, 1930, 1933, and 1934 or the information in the 1920 census.

The AVOOMS index of 84.4 for 1920 for the shared 20 cities looks much more like the GBW adjusted index of 93.5 than like the unadjusted GBW index of 107.3. In 1933 and 1934 all of the indices are much more similar ranging from 79.1 to 82.1 for 1933 and 78.5 to 81.4 in 1934. The AVOOMS, AVOOM1F, and AVOO are no farther apart than 0.3 index points from each other in either year, while the GBW unadjusted and adjusted indices are within 3 index points. The underlying information in each series has flaws. The GBW series rely on memories of purchase prices paid at the time of purchase over an extended period of time and then needs to be adjusted for depreciation in the home, while the AVOOMS relies on owners' perceptions of the market price in 1934 and how it compared to 1933 and 1930.

III.3 Comparisons of Indices for 1940

The AVOOMS index also contrasts sharply with the Shiller-GBW hybrid in 1940. The AVOOMS suggests that home prices fell by 7.2 percent from 1934 to 1940 to a level that was only 73.6 percent of the 1940 level. The Shiller-GBW hybrid index suggests a strong rise that brought housing prices back within 5 percent of the 1930 values. Given that the 1934 to 1940

portion of the Shiller-GBW hybrid was composed of asking prices, it might be that sellers were far more optimistic than most home owners as to the rise in prices over time. It should be noted, however, that the Manhattan hedonic sale price index constructed by Nicholas and Scherbina (2010) also shows a drop from the 1933 and 1934 prices that left the 1939 sale prices approximately 30 percent lower than in 1930.

IV. Expanding the Coverage of Cities Using Medians for the Period 1930 to 1940

One limitation of all of the indices discussed so far is their limited coverage of cities. The AVOOMS index has the broadest coverage but it covers only 40 cities. The coverage can be expanded a great deal for the period 1930 to 1940 using the 1930 and 1940 Census reported values and a greatly expanded set of cities in 1934, 1935, and 1936 for which housing inventory surveys were conducted. This requires a shift from the use of averages to the use of medians because the Census did not report averages for cities in 1930 but did report medians. The housing inventory surveys generally did not report averages or medians but did report distributions of values by value categories. We used a formula for calculating medians using the distributions of values that led to estimated medians that were very close to the 1930 and 1940 reported medians and thus appear useful for calculating medians for the 1934, 1935, and 1936 housing inventory surveys. See Appendix I for the method used and discussion of the comparability of the housing value categories.

One advantage of following this median approach with the data from the Census and housing inventories in the 1930s is that we can use similar methods to estimate median values for the period 2000 to 2010 for reports of housing values in the 2000 Census, and in the American Community Survey from 2003 through 2010. The Census and ACS asked home owners to

report values in categories and not as a continuous measure, so we use the same methods for estimating medians in the modern era as in the 1930s. Even though there are other modern measures of housing value in the form of resale prices of the same homes and median sales prices of new homes, such measures are not currently available without a couple of years of digging into local records for the 1930s. The use of median values for the reported sale values of all owner-occupied homes including those not for sale can be used in both time periods. The disadvantage is that we are relying on self-reported estimates and not actual transactions prices in both periods. The estimates of changes over time should therefore be consistent as long as the biases from such self-reported estimates are consistent over the time frame examined.

The resulting indices for median value for owner-occupied (MVOO) homes indices are reported in Table 2 for a variety of sets of cities that reported in different years. The goal is to show differences across time within the same sets of cities. Comparisons are also included using median indices that use the same cities used by the AVOOMS index and the Shiller-GBW Hybrid indices.

All of the indices indicate a sharp drop in home prices between 1930 and the middle-1930s. For the 181 cities with median values in 1930, sometime in the mid 1930s, and 1940 the MVOO index is 79.7 in the mid 1930s and then drops further to 62.8 by 1940. The 47 small cities that performed inventory surveys for 1935 had experienced an even larger drop to 64 by 1935 and the values fell only slightly more to 63.5 by 1940. Forty more cities that did inventories in 1936 reported a drop to 67.9 by 1936 and then to 66.9 by 1940. The AVOOMS index followed a similar path as the medians, dropping to 79.3 percent of the 1930 level in 1934. After 1934 it continues to drop but only to 73.6 percent by 1940. When the median index is used for the same 40 cities as used in the AVOOMS index the drop to 80 in 1934 is almost the same

as for the medians for more cities. The median index for the 40 AVOOMS cities drops to 64.5 in 1940, which is similar to the drops seen for the other median indexes. The difference in the drops for the averages and the medians suggests that the prices for higher-valued homes were recovering better in the late 1930s than for the lower valued homes.

As was the case for comparisons of the AVOOMS with the Shiller-GBW hybrid, there is a sharp contrast between the picture drawn by the Shiller-GBW hybrid and the median indices in the late 1930s. The Shiller-GBW hybrid index for shows that asking prices in 1940 were 95 percent of the 1930 level. An index of median home values based on the 1930 and 1940 Censuses for the same 5 cities shows a value of 58.9 when it is not weighted by the number of home owners, and 54.5 when it is weighted. In essence, these cities fared much worse than the vast majority of cities because the median index for 1940 relative to 1930 values ranged from 62 to 67 percent for the largest 978 cities, including these 5. The median value reported for Washington, D.C. in the census in 1940 was 81.9 percent of the 1930 value, roughly 9 percent lower than the 91.2 percent value for asking prices reported in the *Historical Statistics*. This implies that the gap between the changes in asking prices and census reported values was much larger for New York, Chicago, New Orleans, and Los Angeles, the other four cities in Shiller's index. The 1940 values in those cities in the bottom of Table 3 ranged from 45 to 58 percent of the 1930 value. The 22 cities examined by Grebler, Blank, and Winnick fared somewhat better than the 5 cities examined by Shiller. Their 1940 median values were 63.5 percent of the 1930 values.

The coverage is largest for the census years 1930 and 1940. Information on medians and value distributions for 978 cities includes all of the cities with more than 2500 population in the United States and many smaller towns and cities. For each of the cities in 1930 and 1940 the

census either directly reported the median value or the distribution of values across categories from which we could calculate a median value. For each city we calculated the ratio of the median value in 1940 to the median value in 1930 to create an index with 1930 =100. Then we calculated means and standard deviations, unweighted and weighted by the number of families owning homes and reporting values in 1930, for different combinations of cities. For all 978 cities with 5.9 million families reporting values in 1930, the median value in 1940 was 62.2 percent of the 1930 value. Table 3 also contains comparisons of the averages across different rankings of cities in terms of families reporting. Home values fell the most in the largest 10 cities in the country. The weighted index shows that the 1940 values were 54.7 percent of the 1930 values in the top 10 cities, which accounted for roughly one-fourth of the households among the 978 cities. The standard deviation across this group of cities was also low at 5.57. As more and more cities are included in the index, the 1940 value rises relative to the 1930 value so that with all cities included the weighted average shows that 1940 values were 62.2 percent of the 1930 values with a standard deviation of 10.2.

The situation looks the same whether using averages or medians for the values reported in 1930 and 1940. The focus has been on medians because the family census of 1930 did not report averages.[10] From IPUMS datasets downloaded from Ruggles, et. al. (2010) we calculate averages and medians for 89 cities in both 1930 and 1940. The 89 cities account for about 2.9 million families in 1930. The number of cities is limited to 89 due to limits on local geographic coding of cities in the 1940 IPUMS sample. Using the medians, the weighted averages across

[10] Wickens (1941) calculated averages for 1930 from census figures on the housing distribution data by making assumptions about the distributions within each category.

cities showed that housing values in 1940 were 59.5 percent of the 1930 value, while using averages for the cities, the values in 1940 were at 55 percent of the 1930 value.

In sum, comparisons of housing values using Census data for 1930 and 1940 show a dramatic decline in housing values of over 40 percent for the decade. This is a sharp contrast to the limited data on median housing asking prices for the five large cities used by Shiller in his housing index.

V. HOLC Values from 1929 Through 1938 Reported by Real Estate Professionals

An alternative set of information on housing prices is available from surveys of neighborhoods performed by the Home Owners' Loan Corporation between 1935 and 1939. The surveys asked local real estate professionals with working knowledge of the neighborhoods to provide information on a variety of features of the neighborhoods, including estimates of the range of housing values and the changes in those values over time within the neighborhoods for up to three kinds of housing. In establishing the range the real estate experts gave a low and high price for the typical homes in the neighborhood. We have compiled information for 83 cities that allow comparisons between prices circa 1929 and the early 1930s (1932 through 1936). For 88 cities comparisons can be made between 1929 and 1937-1938. Table 4 shows the comparisons when values for multiple years are grouped and for each specific year with the number of cities and coverage of home owner households in each comparison. In all cases the index is set such that the 1929 value is equal to 100.

The HOLC data show an even sharper drop in home values between 1929 and the early 1930s than the Shiller-Hybrid index or the census-housing-inventory information. In Table 4 the lowest that the Shiller-Hybrid dropped was to 75.7 percent of the 1929 level in 1933, while the

low home values reported to the HOLC dropped to an average of 65.8 percent of the 1929 level across the years 1932 to 1936. The drop was greatest at almost 40 percent for the 5 cities reporting information for 1929 and 1934. Table 5 shows that the drop from 1929 to the early to mid 1930s was even greater for the high-value homes. The average across cities for the high value homes over the period 1932 to 1936 was 62.1 percent of the 1929 values with lows around 58 percent in 1933 and 1934.

Later in the decade the HOLC data suggests that housing prices recovered somewhat but nowhere nearly as much as the Shiller-GBW Hybrid index suggests. The HOLC data in Tables 4 and 5 show that housing values in 1937 and 1938 had recovered to around 75 to 79 percent of the 1929 level for the high valued homes and 70 to 79 percent of the 1929 level for the low valued homes. In contrast, the Shiller-GBW Hybrid suggests a recovery to around 90 percent of the 1929 level. However, this contrasts with the continued drop in housing prices shown by the census-housing inventory indices, which had fallen to less than 67 percent of the 1930 value, which likely was lower than the 1929 value.

VI. Adding an Estimate for a 1920 Median

Thus far, we have not included a measure of medians that includes 1920 because the 1920 Census did not report the medians for all owner-occupied homes. The AVOOMS index for average values of mortgaged owner-occupied homes is useful but it only covers 40 cities when comparing 1920 to 1930 and 1940. As a robustness check on the AVOOMS index, we have developed an alternative estimate based on comparing the average prices of mortgaged homes for the 273 cities reported in 1920 to the median price of all homes in 1930. This comparison has the advantage in that it includes all of the top 80 cities in terms of number of home owners in

1930 and 183 of the top 200 and covers 4.8 million homes in 1930. It has the disadvantage that the ideal comparison would be between the median value of owner-occupied homes in 1920 and the median value of owner-occupied homes in 1930. We can estimate a median value of owner-occupied homes in 1920 by assuming that the ratio of the median value of owner-occupied homes to the average value of mortgaged owner-occupied homes in 1930 is the same as in 1920 and then multiplying the 1930 ratio by the 1920 average value of mortgaged owner-occupied home.

Using data for 52 cities covering 758 thousand homes in the CWA 1934 survey, we calculated a 1930 ratio for the median value of all owner-occupied homes to the average value of mortgaged owner-occupied homes of 0.9235 with a standard deviation of .09. The unweighted average was 0.922. We then multiplied the 0.9235 ratio by the average value of owner-occupied mortgaged homes in 1920 to obtain an estimate of the median value of all owner-occupied homes in 1920 in each city.

Table 6 shows the estimated indices for median values for 1920, 1930, 1934, and 1940 using different groupings of cities and offers comparisons with the AVOOMS and Shiller GBW Hybrid and GBW adjusted indices. When all 273 cities from the 1920 Census reports are included, the estimated median home value in 1920 is 81.5 percent of the 1930 value, rises to 100 in 1930 and then drops to 60.9 percent in 1940. We can add a 1934 median estimate for 75 cities for which information was reported in 1920, 1930, 1934, and 1940. For just those 75 cities, the median index rises from 83 in 1920 to 100 in 1930 then falls to 79.3 in 1934 and then 62.6 in 1940. For the 40 cities included in the AVOOMS index, the median index and AVOOMS indices track pretty closely. They both move from 86 in 1920 to 100 in 1930, to around 79 or 80 in 1934 and then fall off further by 1940. The median index drops substantially

more by 1940 than does the AVOOMS. Given how well the AVOOMS tracks the Median measure for the 40 cities, it seems reasonable to think that the differences between the median indices for the 40 cities and the 273 cities are based on the selection of the cities. Since the median index covers nearly all of the largest cities and a much larger share of the population base, the median index might well give a more accurate picture of the nationwide change in housing values over time.

The indices based on home prices reported by home owners in the censuses of 1920, 1930, and 1940 look quite different from the Shiller-GBW hybrid index. The census reports suggest that home values rose between 1920 and 1930 rather than the fall described by the Shiller-GBW index. The GBW adjusted index more closely matches the census information. In the 1930s all measures agree that there was a significant drop in housing prices between 1929/1930 and the middle 1930s. But the measures diverge again thereafter. The Shiller-GBW asking price measures suggest a rise in prices that almost reached the 1930 level, while the remaining measures all suggest that home values in the late 1930s remained 26 to 40 percent below the 1930 values.

VII. When and How High Was the Peak Home Value in the 1920s?

Currently, there are five multi-city indices that describe or might proxy the path of housing values during the 1920s: the GBW adjusted and unadjusted series, the rent CPI, the average value of all building permits per family taken care of, and the average value of one-family building permits. The two most closely aligned with our AVOOMS are the unadjusted and adjusted series created by Grebler, Blank, and Winnick (1956) with homeowners reporting values at various points in time. We can improve on the GBW series by adding an additional 31

cities to the 22 cities that they used. The information for the additional cities comes from the hand-written tables derived from the CWA financial survey of 1934 and found in the U.S. Bureau of Foreign and Domestic Commerce Record Group at the National Archives. We followed Grebler, Blank, and Winnick's methods in constructing the index. For example, to create the unadjusted index for the year 1920 for each city, we divided the average "cost of purchase of homes" bought in 1920 from the survey and divided by the average "value of the homes" the home owner reported for January 1, 1934 for that same group of homes. To match all of our other comparisons, we then indexed the series so that the 1930 value in the city was equal to 100.[11] We then aggregated across cities in two ways: an unweighted average across cities and a weighted average using the number of families in owner-occupied homes reporting values in the 1930 census. To create a series adjusted for depreciation, we followed Grebler, Blank, and Winnick by using a 1 3/8 percent compounded annual depreciation rate.

The original GBW series and the New GBW-Style series using different weighting schemes are reported in Table 7 along with the number of cities covered and the number of families in those cities reporting values for owner-occupied homes in the 1930 census. In comparisons of the unadjusted series, the new weighted series starts 1.6 points lower than the original GBW unadjusted series, hits a peak that is 0.5 points higher in 1925, and then falls to a trough in 1933 that is 2.3 points higher. For the series adjusted for depreciation, the new weighted series starts 1.5 points lower than the original GBW series in 1920 hits at peak in 1926 that is 4 points higher than hits a trough in 1933 that is 4.2 points higher than the trough in 1934 for the original GBW adjusted series.

[11]Our calculations for Seattle and Cleveland exactly matched those reported by Grebler, Blank, and Winnick (1956).

Another way to use the New Series is to use the information to interpolate between the benchmark estimates for the AVOOMS for 40 cities for the years 1920, 1930, 1933, 1934 and the benchmarks for 46 cities using the median estimates for 1920, 1930, and 1934.[12] We interpolate for each city individually and then aggregate across cities. Consider the interpolations for the AVOOMS using the New Adjusted Series as an example. We start with the benchmark values for 1920, 1930, 1933, and 1934. We then create ratios of the AVOOMS to the New GBW-Style Adjusted Series in each of those years. For the period between 1920 and 1930 we used a straight-line interpolation to create interpolated ratios for each year. To get the value for 1921 we then multiply the interpolated ratio by the New Adjusted GBW-Style value in 1921; similar calculations were made for 1922 through 1939. A similar process was used to obtain values for 1931 and 1932.[13] This method was used for all other interpolations. We then aggregated across cities using weighted averages with the number of families in owner-occupied homes reporting values in the 1930 Census as the weights.

We have interpolated the AVOOMS and the median series using both the new unadjusted series and the new adjusted series. The two AVOOMS series in Table 7 show that there is not much difference in the values that are interpolated by the adjusted and those interpolated by the unadjusted series for the 1920s, as they are never more than 0.4 points apart. When the time series are forced to match the benchmarks in 1920 and 1930, the main differences come in the

[12] We can create the AVOOMS interpolated series for up to 45 cities if we stop in 1934. The requirement to have a value for 1940 from the Census drops 5 cities that are all outside the top 100 cities in terms of population. The number of families in 1930 lost is 21536. The difference in the index is at most 0.4 in any one of the years. We reported the AVOOMS for 40 cities only to save space.

[13] The formula used was the following with the number referring to the year, the ratio is R, AV is the AVOOMS index and AS is the adjusted series. We calculated R20=AV20/AS20 and R30=AV30/AS30. For the 1921 ratio the ratio is

R21=R20*0.9+R30*0.1, the 1921 interpolated value (IAV21) is IAV21=R21*AS21.

timing and the size of the peaks and both the unadjusted and adjusted time series have peaks at roughly the same time.

In addition to the AVOOMS and Median series, we have included the Shiller-GBW hybrid, the rent CPI, and the average values of building permit series in Table 7 so that it is easy to compare all rises and falls in housing values. Many of the series also appear in Figure 4. Table 7 also includes 1940 values for the series that have values in that year. All of the series show a peak in housing values in 1925 or 1926 with the exception of the average values for building permits, which peak in 1929 and 1930. The largest growth rate in value between 1920 and the peak is 26 percent for the rent CPI, followed by the AVOOMS and Median indices at around 21 or 22 percent. The smallest growth is 3.6 percent for the unweighted new series and only 6 percent for the original GBW unadjusted series and the Shiller-GBW Hybrid.

The largest decline in value between the peak in the 1920s and the trough after 1930 is a 38.6 percent decline for the median series from a peak of 104.9 in 1926 to a low of 64.4 in 1940. This is rivaled by the drops for the rent CPI of 38 percent from the peak of 110.7 in 1925 to the bottom of 68.6 in 1934. Both AVOOMS series fall roughly 30 percent from peaks above 105 in 1926 to a low of 73.6 in 1940. The Shiller-GBW Hybrid also falls about 30 percent from a peak of 113.8 in 1925 to a bottom of 79.1 in 1933. The smallest declines are the falls of around 21 percent for the New Adjusted series for 53 cities from peaks in 1925 to troughs in 1933.

The bottom line for all of the series is that they all peak sometime between 1925 and 1930, and they all fall sharply by 20 to 30 percent by around 1933 or 1934. The differences lie in the estimates of the rise from 1920 to the peak and the changes in prices after 1934. The indices based on the unadjusted GBW methods, including the Shiller-GBW Hybrid all start in 1920 at a

level above the value in 1930 and thus end up with a relatively small rise to the peak of 3 to 8 percent between 1920 and the mid 1920s. All of the remaining indices start at least 6.5 percent *below* the 1920 level and thus show rises to from 1920 to the 1920s peak of 13.5 to 26 percent. After 1940, the Shiller-GBW Hybrid suggests a rise in home values to 95 percent of the 1930 value, while all other series show 1940 values that are 18 to 36 percent below the 1930 values.

VIII. COMPARISONS TO MODERN SERIES

To make the comparisons in of housing price trends across periods, we sought to use similar data and the same methods in the 2000s as we used in the 1920s and 1930s. There are a number of home price and value series available in the 2000s. We focus on the surveys followed the lead of surveys in the 1920s and 1930s by asking all home owners to report the sale value of their home, whether the home was for sale or not. The Census of 2000 and the American Community Surveys between 2003 and 2010 asked home owners "to estimate the full current market value of the property, including both house and land, even if the respondents owned only part of the property." "Apart from group quarters, all owner-occupied or vacant-for-sale units were covered, including mobile homes, condominiums, units with offices or businesses attached, and houses on lots of any size. For mobile homes in pre-2008 ACS and PRCS data, the value of the land was included in the value; in the 2008 ACS…, land value was included only if the owner of the mobile home also owned the land."

The 2000 Survey and the ACS surveys asked people to report their home sale values by marking the value category for the home. As a result, the reporting of the information looks very much like the summary tables in the 1930 and 1940 censuses and in the inventory surveys in the

mid 1930s. Therefore, we used the method for calculating medians that we used for the inventory surveys in the mid-1930s.

Table 8 shows medians indexed so that the 2000 value is equal to 100 for a variety of groupings of cities. Indexes across time were calculated for each city using the medians in that city and then were aggregated as a weighted average with the number of owner-occupied homes reporting values in 2000 as the weight. The Case-Shiller repeat sales price index for 10 cities and for 20 cities receives a great deal of attention; therefore, we show the median home values for the Case-Shiller 10-city and 20-city groupings, as well as information for the Top 50, 100, 400, and all cities. Table 8 also contains the Case-Shiller and Office of Federal Housing Enterprise Oversight (OFHEO) Repeat Sales Indices and the Median New Home Sale Price Index for comparisons.

The rise in nominal house prices in the 2000 to 2007 housing boom far outstrips the rise in prices during the housing boom of the 1920s. All of the median values in Table 8 peaked in 2007. The increases between 2000 and 2007 ranged from a high of 125 percent for the 10 cities used in the Case Shiller Index to a low of 91.6 percent for the 400 cities with the most home owners in 2000. These growth rates are 4 to 5 times greater than the growth rates of 21 to 22 percent between 1920 and the peak in the mid 1920s shown by the AVOOMS and Median indices in Table 7. The housing value growth in the 1920s is also substantially lower than housing price growth rates shown by the sale price indices in Table 8, which range from 46.4 percent for new home prices to 109.1 percent for the Case-Shiller-10-city index.

Arguably, the fall in nominal housing prices between 1930 and 1933 was worse than the fall in prices between 2007 and 2010. Here is a case where percentage drops do not tell the

whole story. The AVOOMS and Median indices in Table 7 fell by roughly 17 to 20 percent between 1930 and 1933. The median home values in 2000 fell by 12 to 17 percent from 2007 to 2010, depending on the group of homes examined. A better comparison to the damage done to housing values is how the housing values compared to the start of the periods in 1920 and 2000. In 2010 all the housing indices all show prices that are 32 to 86.8 percent *higher* than they were in 2000. In contrast, by 1933 the home values were *lower* than they were in 1920. Whereas in the Great Recession people saw part of the rise in housing values fall away, during the Great Depression, the entire rise was eliminated and housing prices fell still more. The AVOOMS and the Median estimates in Tables 6 and 7 show that the situation got even worse by 1940, such that home values were 14.5 to 25.5 percent lower than in 1920.

IX. Deflating the Home Price Series by the CPI and Nominal Per Capita Income

The focus has been on nominal price changes because so much of the groundwork starts with getting the nominal prices right. Other prices and incomes were not standing still during these periods; therefore, we show changes in housing prices relative to all prices by deflating by the CPI. In addition, we examine the affordability of housing by dividing the indices by an index for nominal GDP per capita in the two periods.

The experiences for all prices and nominal incomes were quite different in the 1920-1940 period and the 2000s. The 2000s was a period of mild CPI price inflation of 2.5 percent per year while nominal GDP per capita grew fast enough that real per capita incomes grew through 2007 before a decline during the recession. Real per capita incomes have nearly caught up to the 2007 level again in 2011. In contrast the 1920s followed the end of a dramatic inflation during World

War I. The CPI fell 20 percent between 1920 and 1922; then the economy went through mild inflations and deflations through 1929. The Great Contraction was associated with a 25 percent drop in the CPI from 1929 to 1933. During the rest of the 1930s, there was a mild inflation of 2.7 percent per year from 1933 to 1937, followed by mild deflation from 1937 to 1939. Meanwhile, per real capita incomes fell sharply in the recession at the beginning of the 1920s, grew relatively quickly until 1929 and then fell by 30 percent between 1929 and 1933. Real income per capita did not reach its 1929 level again until 1940.

IX.1 Adjusting for the CPI.

The adjustment for CPI inflation does not change the story of housing prices in the 2000s much. The rise in relative housing prices from 2000 to 2006/2007 is dampened relative to the rise in nominal housing prices. For example, real median housing values for the Top 400 cities rose only 46.9 percent in Table 9 compared with the nominal price rise of 91.6% shown in Table 7. The decline in real housing prices from 2006/2007 to 2010 looks worse. The Median index for the top 400 cities fell 16.6 percent to 132.9. Meanwhile, the resale price indices adjusted for CPI inflation and new home sales price indices fell to roughly the same levels they had reached in 2000.

The wild gyrations in the price level in the 1920s and 1930s cause the housing prices adjusted for inflation to follow a substantially different path than nominal housing prices did. Instead of rising to a peak in the mid-1920s and then declining until 1940, as the nominal housing prices did, the AVOOMS and Median indices adjusted for inflation in Table 10 and Figure 5 rose roughly 41 percent to a peak in 1928, fell slightly to 1930 and then rose to a new higher peak in 1933. The real housing prices then declined to a level in 1940 that lay somewhere

between the 1920 and 1922 levels.[14] Whatever home owners gained in real value after 1920, they had largely lost by 1940. The other series all follow a similar pattern of a temporary peak in the 1920s and then a higher peak around 1931, 1932 or 1933. All but the GBW-Hybrid series also then experience a decline in real value. In contrast, the GBW-Hybrid series rises to a new peak in 1940 that is more than 27 percent higher than the 1920 value.

IX.2 Affordability: Housing Prices Relative to Income

The affordability indices shows the ratio of the indices for home prices to indices for nominal GDP per capita. When the index rises, houses become more expensive relative to people's incomes. As with the adjustments for the CPI, scaling housing prices relative to incomes dampens the growth rate in relative housing prices relative to the growth rate in nominal housing prices. Nominal Median Housing Values for the top 400 cities rose 91.6 percent, but they rose only 47 percent faster than incomes rose during the period, as seen in Table 9. Housing prices than fell relative to incomes afterward so that housing values relative to incomes were somewhere between the values in 2003 and 2005.

[14] Most studies adjust for inflation by dividing by a measure of the price level, either the Consumer Price Index or the Implicit Price Deflator used to deflate Gross Domestic Product. The idea is to adjust for changes in the price level driven by changes in the money supply. This makes perfect sense with a neutral inflation or deflation where most prices are moving in the same direction. It becomes a trickier question when relative prices are changing dramatically, as they did in the 1920s and 1930s and again in the 2000s. Rents rose rapidly until 1925 while the prices of the rest of the goods had fallen sharply between 1920 and 1922. Between 1925 and 1933 rents fell more than the prices of the rest of the goods and rents stayed substantially lower than prices for the remaining goods for the rest of the 1930s. However, it turns out that it does not make too much difference to the index when it is deflated by either the overall CPI or by the nonrent CPI. The magnitudes are different but the same story is told. The AVOOMS home value index relative to the overall CPI rises from 71.9 in 1920 to 100 in 1930. It then rises to 106.6 because there was severe deflation during the early 1930s before falling to 98.9 and then 87.7. When the adjustment is relative to the price index for nonrent goods, the rise is from 67.9 in 1920 to 100 in 1930 to 105.5 in 1933 then a decline to 95.9 and 85.9. The median housing value estimates follow a similar path from 68 in 1920 to 100 in 1933 to 72.6 in 1940 relative to the full CPI, and from 64.3 to 100 to 71.1 relative to the nonhousing CPI.

In the earlier period every series in the right side of Table 10 and in Figure 6 shows that housing price rose much faster than incomes between 1920 and 1922. The houses became 23 to 33 percent less affordable in that 2 year span. Incomes grew faster than housing prices until 1929 when nearly all of the indices bottom out around 89 to 93. Then all hell broke loose. Housing prices fell, but incomes fell much faster. By 1933 the index had risen to over 130 in every housing value index. From the peak affordability level reached in 1929, houses had become 44 to 50 percent less affordable. For the rest of the decade every series except the Shiller-GBW hybrid shows a large drop in the index to levels that made housing 11.8 to 30.4 percent more affordable relative to income than in 1929 and 7 to 20 percent more affordable than in 1920. In all cases incomes rose much faster than housing prices over the rest of the decade.

X. Conclusions

The most commonly cited time series for nonfarm home values and prices between 1920 and 1940 was created by Robert Shiller with a goal of showing long run housing prices from 1890 to the present. Shiller relied on a series developed by Grebler, Blank, and Winnick (1956) for 1890 to 1934 and then spliced in a new series based on 30 asking prices per year in five major cities to extend the series from 1934 to 1953. The emphasis on obtaining annual series that are consist over the long run caused the scholars to avoid using information from the U.S. Censuses and other sources to more carefully examine the period from 1920 to 1940. In this paper we develop a new version of the Grebler, Blank, and Winnick series for 1920 to 1934 that includes nearly 2.5 times as many cities, as well several alternative measures for changes in housing prices between 1920 and 1940 that are based on information collected from other

government publications and archival sources. We then use the information to compare and contrast the changes in housing prices during the boom and bust in housing prices between 1920 and 1940 and the modern day boom and bust in the 2000s.

The new indices and the Shiller-GBW Hybrid Indices all show that nominal housing prices fell by somewhere between 20 and 30 percent from a peak between 1925 and 1930 to a low level around 1933 and 1934. However, there is substantial disagreement about the values circa 1920 and 1940. For 1920 the Shiller-GBW Hybrid suggests that housing values were 4.9 to 7.3 percent *higher* than they were in 1930, while all the series based on 1920 mortgage Census information, the rent CPI, average values of residential building permits and Grebler, Blank, and Winnick's preferred series adjusted for depreciation show that housing values circa 1920 were anywhere from 6.5 to 20 percent *lower* than in 1930.

For 1940 the Shiller-GBW Hybrid index shows that housing prices had returned to *within 5 percent* of the 1930 value. In contrast, all of the other series have 1940 values that are *18.7 to 35.6 percent lower* than in 1930. In summary, the most commonly cited current series suggests much lower growth rates in nominal housing prices between 1920 and the mid-1920s peak than all of the other series show and a much stronger recovery after 1933 than any other series. In fact, several of the series suggest declines from 1933 to 1940 rather than recovery.

Comparisons of the booms and busts in nominal home values show that the growth in nominal home values between 2000 and 2006/2007 was much more rapid than in the 1920s boom. Home values fell significantly between 2007 and 2010, but nominal values remained substantially higher than in 2000. For every housing measure except the current Shiller-GBW Hybrid the situation in the 1930s will give people pause in the modern era. After housing prices

fell sharply between 1930 and 1933, nominal housing values failed to rebound by 1940 to anywhere near their 1930 level, nor did they reach their 1920 level. In fact, several series suggest that housing prices continued to fall until 1940.

When housing values are adjusted for CPI inflation, the growth rate in housing values is dampened between 2000 and 2006/2007, but it is still substantially larger than the growth in the 1920s boom. The median values reported by all home owners for the top 200 cities grew 59.4 percent between 2000 and 2006, compared with growth rates of 35 to 42 percent for similar indices in the boom period between 1920 and 1928. The bust from 2007 to 2010 shows strong declines in median real home values reported by all home owners but leave people with values at least 30 percent above the values in 2000. The changes in inflation-adjusted home values from 1928 to 1933 look quite different from the sharp declines in nominal home values because of the 30 percent deflation in all prices between 1929 and 1933. Between 1928 and 1933, inflation-adjusted home values declined for a couple of years and then rose to a new peak that was higher than the peak in the 1920s. Between 1933 and 1940 real home prices fell for every series except the extant GBW-Shiller Hybrid series to levels that were between the levels seen between 1920 and 1922. If by some chance the modern era repeats the pattern in the 1930s, home values may continue to decline over the next several years.

The affordability of housing was examined by comparing the ratio of home values to per capita income over time. In the 2000s boom, median housing values reported by all home owners rose 47 percent faster than income before the index fell back to a level 27 percent above the 2000 ratio. In the 1920s the sharp recession in 1921-1922 caused incomes to fall while housing prices were rising, leading to an early peak in 1922 in the ratio. By 1929 home price affordability had risen sharply, as nominal housing prices started declining after 1925 and per

capita incomes rose. The Great Contraction caused per capita incomes to fall much more quickly than housing prices fell between 1929 and 1933, and housing became much less affordable. The situation reversed itself by 1940, causing the ratio of housing prices to incomes to fall below the ratios in 1920, so that relative to income housing was more affordable than at any time in the intervening period.

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Appendix I

Calculating Medians from the Reported Distributions of Housing Values

The 1940 Census of Housing reported median values for homes in each city for both 1930 and 1940. They also reported distributions of housing values for 1940 and the 1930 Census of Housing reported both medians and distributions of housing values for 1930. We also calculated medians for housing values from the distribution in the following way. The most commonly reported categories for cities in the 1930 and 1940 census and in the housing inventories were values from $1-$999, $1000-$1499, $1500-$1999, $2000-$2499, $2500-$2999, $3000-$3999, $4000-$4999, $5000-$7499, $7500-$9999, and $10000 and over. The 1930 census also included categories for $10,000-$14999, $15000-$19999 and $20000 and over. 67 of 960 cities with information in 1930 had medians higher than $10,000, but the census reported those medians. By 1940 only 13 of 956 cities had median housing values higher than $10,000. When we calculated the medians from the distribution information, we followed a procedure similar to the following procedure. Create the cumulative distribution for the categories, pick the category in which the cumulative percentage (CPH) is higher than 50 with a top income of YH and the cumulative percentage of the next lower category (CPL) is less than 50 with a top income of YL. The formula used to calculate the median is (50-CPL)/(CPH-CPL)*(YH-YL). For example, if 46 percent of the homes were valued at $2999 or less and 53 percent were values at $3999 or less, the median is calculated as (50-46)/(53-46)*(3999-2999).

The housing inventories for 1934, 1935, and 1936 from the property inventories and the financial survey of housing in 1934 did not report median or average values, although they did report distributional information. We used the same formula for the median as described above. The categories used in the 1934 Financial Survey of Housing for 65 cities were $1-$999, $1000-$1499, $1500-$1999, $2000-$2999, $3000-$3999, $4000-$4999, $5000-$7499, $7500-$9999, $10000-$14999, $15000-$19999; and $20,000 and over. The only difference was the lack of a split at $2500 within the $2000-$2999 category. Another 31 city inventories in 1934 reported information for $1-$999, $1000-$1499, $1500-$1999, $2000-$4999, $5000-$9999, $10000-$19999; and $20,000 and over. The estimates of the medians for these cities are therefore subject to more measurement error.

The categories for the 1935 inventories were the same as for 1930 for 11 of the 49 cities except the category for $1000-$2000 was not split at the $1500 value. The remaining 38 cities had the same categories as in 1930 except that the values from $5,000 to $10,000 were split into $5000-$5999, $6000-$7999 and $8000-$9999. These same categories were also used in city inventories for 41 cities in 1936.

Appendix II

Comparability of the Surveys in 1930, 1940, and the 2000s.

The IPUMS description of how housing values were reported in the original census manuscripts for 1930 and 1940 say that “enumerators consulted with the owners to estimate the sale value of the housing unit. For single-family, non-farm houses, the estimate included the value of the house and land….For owner-occupied units that were part of a building containing other households or businesses (except a small room used by the owner for an office), the estimate included only the value of the part of

the house in which the owner's household lived. For example, if the owning household of a two-family house rented half of the house to another household, only half of the house's value would have been reported…." This information was downloaded from IPUMS USA website http://usa.ipums.org/usa-action/variables/VALUEH#comparability_tab on April 17, 2012.

For the 2000 census and the American Community Surveys of 2003 and 2005-2010, "respondents estimated the full current market value of the property, including both house and land, even if the respondents owned only part of the property." "Apart from group quarters, all owner-occupied or vacant-for-sale units were covered, including mobile homes, condominiums, units with offices or businesses attached, and houses on lots of any size. For mobile homes in pre-2008 ACS…data, the value of the land was included in the value; in the 2008 ACS…land value was included only if the owner of the mobile home also owned the land." Downloaded from IPUMS USA website http://usa.ipums.org/usa-action/variables/VALUEH#comparability_tab on April 17, 2012.

Table 1
Housing Value Indices for the Average Value of Owner-Occupied Mortgaged Properties, 1920, 1930, 1933, 1934, 1940,
(1930 Value=100)

						Cities used by Grebler, Blank, and Winnick				
Year		AVOOM	AVOOM1F	AVOOMS	5GBW Hybrid	GBW Unadjusted	GBW Adjusted	AVOOMS	AVOOM1F	AVOO
1920	Mean	86.1	n.a.	86.1	107.3	107.3	93.5	84.4	n.a.	n.a.
	Std. Dev.	12.3						12.6		
1930	Mean	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Std. Dev.									
1933	Mean	82.6	82.5	82.6	79.1	79.1	82.4	82.2	82.2	82.1
	Std. Dev.	3.9	4.1					3.6	3.7	3.8
1934	Mean	79.2	79.3	79.2	81.4	81.4	80.6	78.7	78.8	78.5
	Std. Dev.	4.4	4.5					3.9	4.1	4.2
1940	Mean		73.6	73.6	95.6	n.a.		71.2	n.a.	70.0
	Std. Dev.		10.7					10.0		12.9
Number of cities		40	40	40	22 [1930-34] or 5 [1934-40]	22	22	20	22	22
Number of families in 1930 in cities		715328	715328	715328	497,329 [1930-34] or 807,944 [1934-40]	497329	497329	491552	497329	497329
Top 10		1	1	1	3	1	1	1	1	1
Top 50		14	14	14	5	12	12	12	12	12
Top 100		27	27	27		18	18	18	18	18
Top 200		36	36	36		20	20	20	20	20

Sources: AVOOM stands for average value of mortgaged owner-occupied homes. The 1F refers to one-family homes. The index uses only cities with information in all three sources. The average values of mortgaged owner-occupied homes were reported for 1920 in U.S. Bureau of the Census (1923, 18,173-8) and for 1930 in hand written tables from U.S. Bureau of Foreign and Domestic Commerce (undated). The average

values of mortgaged one-family owner-occupied homes were reported for 1930, 1933, and 1934 in Home Owners' Loan Corporation (undated) and for 1940 in (U.S. Bureau of the Census 1943, Volume IV, Part 1, p. 80, 88-9). The Shiller-GBW Hybrid adjusted for inflation is graphed in Shiller (2005, 36) and was downloaded from http://www.econ.yale.edu/~shiller/data.htm on April 24, 2012. From 1920 through 1934 it is the same as the Grebler, Blank, and Winnick (GBW) unadjusted index. The GBW adjusted and unadjusted indices are from Grebler, Blank, and Winnick (1956, 342-356) and are reported as series Dc826 and Dc827 in Snowden (2006, 4-515).

Table 2

Indexes Based on Median Values of Owner Occupied Homes in 1930, 1934, 1935, 1936, and 1940 for Different Samples of Cities

(1930 Value =100)

		Median Index for Cities Reporting in								Other Indexes	
Year		1930 &1940	Mid 1930s	1934	1935	1936	Shiller (1934-1940)	AVOOMS	Used by GBW	Shiller-GBW	AVOOMS
1930	Mean	100	100		100	100	100	100	100	100	100
	Std. Dev.										
1934-1936	Mean		76.0								
	Std. Dev.		14.9								
1934	Mean		79.7					80	77.8	81.4	79.3
	Std. Dev.		14.7					14.6	13.5		
1935	Mean				64.0					89.3	
	Std. Dev.				11.6						
1936	Mean					67.9				92.2	
	Std. Dev.					9.5					
1940	Mean	62.2	63.5		63.5	66.9	54.6	64.5	63.5	95.6	73.6
	Std. Dev.	10.2	9.0		8.2	6.3		8.2	8.1		
Coverage of Cities											
Number if Cities		978	181	94	47	40	5	40	22	5	40
Number of Families		5871658	1824940	1326971	196742	301227	807,944	715328	497329	807,944	715328
Number of Cities in											
Top 10		10	3	3	0	0	3	1	1	3	1
Top 50		50	25	20	0	5	5	14	12	5	14
Top 100		100	50	37	4	9		27	18		27
Top 200		200	80	56	12	12		36	20		36

Source: Information on median values for each city in 1930 and 1940 comes from U.S. Bureau of Census (1943, Volume II, Parts 1-5, Table 24 for each state). Information on median values was calculated from distributional information reported in Wickens (1937), U.S. Bureau of Foreign and Domestic Commerce (undated), and Works Progress Administration and Stapp, Peyton (1938). Weighted means and standard deviations use the number of families owning and occupying nonfarm homes who reported home values in the city in 1930 from the U.S. Bureau of the Census (1933, pp. 60, 73-81 and Tables 7, 21, and 23 for each state).

Table 3
1940 Median Index Values of Owner-Occupied Homes, Averaged Across Cities
(1930 Value=100)

		Unweighted	Weighted by the number of families owning homes in 1930	Number of families in 1930 Covered
All	Mean	65.5	62.2	5,871,143
	Std. Dev.	11.4	10.2	
Top 10	Mean	56.0	54.7	1,476,142
	Std. Dev.	5.8	5.7	
Top 20	Mean	61.8	58.0	1,960,161
	Std. Dev.	9.9	8.8	
Top 30	Mean	63.7	59.4	2,300,426
	Std. Dev.	9.6	9.3	
Top 40	Mean	62.9	59.5	2,543,589
	Std. Dev.	8.8	9.0	
Top 50	Mean	62.8	59.7	2,732,899
	Std. Dev.	9.0	9.0	
Top 100	Mean	62.9	60.3	3,345,022
	Std. Dev.	9.7	9.4	
Top 200	Mean	62.7	60.6	4,043,384
	Std. Dev.	9.7	9.4	
Top 300	Mean	63.2	61.0	4,487,624
	Std. Dev.	9.8	9.5	
Shiller 5 cities	Mean	58.9	54.6	807,944
	Std. Dev.	13.7	8.7	
GBW cities	Mean	65.7	63.5	497,329
	Std. Dev.	9.0	8.2	
Specific Cities				
Washington D.C.		81.9		46,208
Cleveland		53.1		80,047
Seattle		72.8		49,874
New York		57.1		341,491
Chicago		45.2		257,923
New		53.0		30,264

Orleans		
Los Angeles	57.7	132,058

Source: U.S. Bureau of Census (1943, Volume II, Parts 1-5, Table 24 for each state). Weighted means and standard deviations use the number of families owning and occupying nonfarm homes who reported home values in the city in 1930 from the U.S. Bureau of the Census (1933, pp. 60, 73-81 and Tables 7, 21, and 23 for each state).

Table 4
Home Value Indices for Low Range Homes Based on Reports by Real Estate Experts for Neighborhoods, 1929-1938 (1929 Value=100)

Year		Both	1932	1933	1934	1935	1936	1937	1938
1932-1936	Mean	69.7							
	Std. Dev.	20.4							
1937-1938	Mean	79.5							
	Std. Dev.	19.0							
1932	Mean		65.2						
	Std. Dev.		10.6						
1933	Mean								
	Std. Dev.								
1934	Mean								
	Std. Dev.								
1935	Mean					73.3			
	Std. Dev.					34.7			
1936	Mean						71.4		
	Std. Dev.						9.0		
1937	Mean							76.6	
	Std. Dev.							8.8	
1938	Mean								70.2
	Std. Dev.								19.8
Number of Cities		82	18	13	5	19	19	66	23
Number of Families		1335384	171443	176543	384801	164487	280761	869564	641326
Top 10		3	0	0	1	0	1	2	1
Top 50		15	1	1	2	2	6	10	8
Top 100		33	5	5	2	8	9	22	14
Top 200		62	13	8	5	13	16	48	20

Source: Home Owners' Loan Corporation (no date). All means and standard deviations are weighted by the number of home owners reporting values of homes in the city in the 1930 Census.

Table 5

Home Value Indices for High Range Homes Based on Reports by Real Estate Experts for Neighborhoods, 1929-1938 (1929 Value=100)

		Both	1932			1935	1936	1937	1938
1932-1936	Mean	62.6							
	Std. Dev.	13.1							
1937-1938	Mean	75.0							
	Std. Dev.	29.0							
1932	Mean		65.0						
	Std. Dev.		14.3						
1933	Mean			58.5					
	Std. Dev.			10.3					
1934	Mean				58.2				
	Std. Dev.				1.8				
1935	Mean					66.7			
	Std. Dev.					26.2			
1936	Mean						67.0		
	Std. Dev.						11.9		
1937	Mean							78.8	
	Std. Dev.							80.4	
1938	Mean								77.7
	Std. Dev.								40.5
Number of Cities		82	18	13	5	19	19	66	23
Number of Families		1335384	171443	176543	384801	164487	280761	869564	641326
Top 10		3	0	0	1	0	1	2	1
Top 50		15	1	1	2	2	6	10	8
Top 100		33	5	5	2	8	9	22	14
Top 200		62	13	8	5	13	16	48	20

Source: Home Owners' Loan Corporation (no date). All means and standard deviations are weighted by the number of home owners reporting values of homes in the city in the 1930 Census.

Table 6
Indices with Estimates of Median for 1920 Compared with Other Indices, Different City Groupings, 1920-1940 (1930 Value=100)

					Median Estimates for Cities with Values in			
		AVOOMS	Shiller-GBW Hybrid	GBW-Adjusted	1920 Census	1920 Census and 1934 Inventories	Cities for AVOOMS	Rent CPI
1920	Mean	86.1	107.3	93.5	81.5	83	86	88.8
	Std. Dev.	12.3			14.1	11.4	11	12.12
1930	Mean	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Std. Dev.							
1933	Mean	82.5	79.1	82.4				72.1
	Std. Dev.							9.5
1934	Mean	79.3	81.4	80.6		79.3	80.0	67.9
	Std. Dev.					13.4	14.6	9.2
1940	Mean	73.6	95.6		60.9	62.6	64.5	76.3
	Std. Dev.				9.6	9.1	8.3	5.4
Number of Cities		40	5*	22	273	75	40	32
Number of 1930 Families		715328	807944*	497329	4282297	1270107	715328	2123992
Top 10		1	3*	1	10	3	1	9
Top 50		14	5*	12	49	19	14	25
Top 100		27		18	97	32	27	29
Top 200		36		20	184	56	36	31

Sources: See text and Notes to Tables 1-5. All means and standard deviations are weighted by the number of home owners reporting values of homes in the city in the 1930 Census.

*These numbers reflect the coverage of the Shiller asking price index for 5 cities from 1934 through 1940. The period 1920 through 1934 covers the same cities as the GBW-Adjusted Index.

Table 7
Old and New GBW-Style Housing Value Series, Interpolated AVOOMS and Median Series, and Existing Series, 1920-1934, and 1940
(1930 Value=100)

year	Original GBW Unadjusted	New GBW-style Unadjusted, Unweighted	New GBW-style unadjusted, weighted	Original GBW adjusted	New GBW-Style Adjusted, unweighted	New GBW-Style, Adjusted, Weighted	AVOOMS interpolated with New GBW-Style, Unadjusted	AVOOMS interpolated with New GBW-Style Adjusted, Weighted	Median Interpolated with New GBW-Style Adjusted	Shiller GBW-Hybrid	Rent CPI	Average Value of Residential Building Permits	Average Value of 1-Family Building Permits
1920	107.3	107.7	105.7	93.5	93.8	92.0	86.1	86.1	86.4	107.3	87.8		
1921	104.9	110.2	107.2	92.7	97.3	94.7	89.9	89.7	89.8	104.9	100.8	90.0	79.5
1922	106.4	109.4	107.8	95.3	98.0	96.5	92.5	92.2	92.2	106.4	103.8	91.6	85.3
1923	107.9	111.4	111.1	98.0	101.1	100.9	97.7	97.4	96.8	107.9	106.4	94.1	83.9
1924	108.2	111.4	112.5	99.6	104.5	103.5	100.7	100.3	99.9	108.2	110.3	99.5	86.9
1925	113.8	111.6	114.3	106.2	108.0	106.6	103.7	103.3	103.0	113.8	110.7	101.4	92.0
1926	109.2	111.3	113.5	103.4	107.1	107.4	105.5	105.1	104.9	109.2	109.6	100.8	95.4
1927	105.1	110.3	110.3	100.8	105.8	105.8	104.5	104.1	104.1	105.1	107.8	101.5	96.7
1928	106.7	109.5	109.1	103.7	106.5	106.1	104.9	104.6	104.7	106.7	105.3	100.5	98.9
1929	104.5	107.0	105.5	103.0	105.7	104.1	103.4	103.2	103.2	104.5	102.8	104.1	98.5
1930	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1931	91.8	92.9	92.4	93.1	94.2	93.7	92.9	92.9	91.8	91.8	94.7	96.4	96.8
1932	82.2	83.3	83.0	84.4	85.7	85.3	84.6	84.6	82.3	82.2	85.0	84.5	78.4
1933	79.1	81.0	81.4	82.4	84.4	84.8	82.6	82.6	80.5	79.1	73.2	79.7	77.0
1934	81.4	83.7	81.9	80.6	88.5	86.6	79.2	79.2	80.4	81.4	68.6	81.5	81.5
1940							73.6	73.6	64.4	95.6	76.0	81.3	77.9
Maximum	113.8	111.6	114.3	106.2	108.0	107.4	105.5	105.1	104.9	113.8	110.7	104.1	100.0
Year of Max	1926	1925	1925	1926	1925	1926	1926	1926	1926	1925	1925	1927	1930
Minimum	79.1	81.0	81.4	80.6	84.4	84.8	73.6	73.6	64.4	79.1	68.6	79.7	77.0
Year of Min	1933	1933	1933	1934	1933	1933	1940	1940	1940	1933	1934	1933	1933
Growth Rate 1920 to Max	6.0	3.6	8.1	13.5	15.1	16.7	22.5	22.1	21.4	6.0	26.0	15.7*	25.7*
Growth Rate Max to Min	-30.5	-27.4	-28.8	-24.1	-21.8	-21.1	-30.2	-30.0	-38.6	-30.5	-38.0	-23.4	-23.0
Growth Rate 1930 to 1933	-20.9	-19.0	-18.6	-17.6	-15.6	-15.2	-17.4	-17.4	-19.5	-20.9	-26.8	-20.3	-23.0
Number of Cities	22	53	53	22	53	53	40	40	46	22	32	257	257
Families in 1930 in cities covered	4973291	7612041	7612041	4973291	7612041	7612041	7153281	7153281	7397539	497329	2123992		
Top 10	1	1	1	1	1	1	1	1	1	1	9	10	10

Top 50	12	14	14	12	14	14	14	14	14	12	25	50	50
Top 100	13	27	27	13	27	27	27	27	27	13	29	100	100
Top 200	20	37	37	20	37	37	36	36	37	20	31	200	200

Table 8
Comparisons of Housing Price Indices
(Year 2000 Value=100)

	Median Indices All Home Owners in Census and American Community Surveys						Repeat Sales Price Indices			New Homes Sale Price	
Year	All	Top 50	Top 100	Top 400	Case Schiller 10 Cities	Case-Schiller 20 Cities	Case Shiller 10 Cities	Case Shiller 20 Cities	OFHEO	Median	CPI Housing
2000	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2003	128.0	134.2	128.6	128.0	172.7	140.9	140.8	134.0	123.3	114.9	109.0
2005	169.2	174.6	170.0	169.2	201.9	180.2	194.7	179.0	148.9	140.6	115.4
2006	186.5	193.1	187.7	186.5	222.4	198.4	209.1	192.6	158.0	145.9	119.8
2007	191.6	197.3	192.5	191.6	225.0	201.6	199.8	185.2	158.3	146.4	123.6
2008	188.2	193.1	189.3	188.2	214.9	195.6	166.4	156.0	146.4	138.3	127.5
2009	173.7	176.5	174.4	173.7	193.0	176.8	144.9	135.3	138.7	128.8	128.0
2010	168.3	170.3	168.9	168.3	186.8	169.8	147.9	136.9	134.5	132.8	127.5
2011							142.8	131.6	128.7	134.5	129.2
Peak Year	2007	2007	2007	2007	2007	2007	2006	2006	2007	2007	2011
Growth Rate 2000 to peak	91.6	97.3	92.5	91.6	125.0	101.6	109.1	92.6	58.3	46.4	29.2
Growth Rate Peak to 2010	-12.1	-13.7	-12.3	-12.1	-17.0	-15.8	-29.3	-28.9	-15.0	-9.2	n.a.

Sources: Median Sale Values Reported by All Home Owners created indices for medians within each city over the years with year 2000 values =100 and then aggregated across cities with averages weighted by the number of home owners reporting values in the year 2000. The data come from microdata samples from the 2000 Census and 2003-2010 American Community Surveys downloaded from Ruggles, et. al. (2010) at www.ipums.org. The S&P/Case-Shiller Repeat Sales Price was downloaded from http://www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/en/us/?indexId=spusa-cashpidff--p-us---- on April 24, 2012 and the monthly data were averaged for each year. The OFHEO

(Office of Federal Housing Enterprises Oversight) indices was downloaded from http://www.fhfa.gov/Default.aspx?Page=14 on April 30, 2012. The Median New Home Sales Price Index was downloaded from http://www.census.gov/const/uspricemon.pdf on May 1, 2012.

Table 9
Home Value Indices Relative to Consumer Price Index and Per Capita GDP, (2000 Value=2000)

	Home Values Adjusted for CPI Inflation					Home Prices Relative to Per Capita GDP				
Year	Case-Shiller Repeat Sales, 20 Cities	Median Home Values 20 CS Cities	Median Home Values Top 400	OFHEO Repeat Sales	Median New Home Sale price	Case-Shiller Repeat Sales, 20 Cities	Median Home Values 20 CS Cities	Median Home Values Top 400	OFHEO Repeat Sales	Median New Home Sale price
2000	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2003	125.4	131.8	119.7	115.4	107.5	123.3	129.6	117.7	113.4	105.7
2005	157.9	158.9	149.2	131.3	124.0	148.1	149.0	140.0	123.2	116.3
2006	164.5	169.5	159.3	134.9	124.7	151.7	156.3	146.9	124.4	115.0
2007	153.8	167.4	159.1	131.5	121.5	140.5	152.9	145.3	120.1	111.0
2008	124.8	156.4	150.6	117.1	110.7	117.2	147.0	141.5	110.0	104.0
2009	108.6	141.9	139.4	111.3	103.4	105.1	137.4	135.0	107.8	100.1
2010	108.1	134.1	132.9	106.3	104.9	103.0	127.7	126.6	101.2	99.9
2011	100.8			98.6	103.0	95.9			93.8	98.0
Year of Peak	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
Growth Rate 2000 to Peak	64.5	69.5	59.3	34.9	24.7	51.7	56.3	46.9	24.4	16.3
Growth Rate Peak to 2010	-34.3	-20.9	-16.6	-21.3	-15.8	-32.1	-18.3	-13.8	-18.7	-14.1

Sources: See Table 8. The Consumer Price Index was downloaded from the BLS website, www.bls.gov. Per Capita GDP was downloaded from the Measuring Worth Website http://www.measuringworth.com/uscompare/.

Table 10
Housing Values Relative to CPI and GDP Per Capita, 1920-1940
(1930 Value =100)

	Housing Values Adjusted for CPI Inflation					Housing Values Relative to GDP Per Capita				
year	New GBW-Style, Adjusted, Weighted	AVOOMS interpolated with New GBW-Style Adjusted, Weighted	Median Interpolated with New GBW-Style Adjusted	Shiller GBW-Hybrid	Average Value of 1-Family Building Permits	New GBW-Style, Adjusted, Weighted	AVOOMS interpolated with New GBW-Style Adjusted, Weighted	Median Interpolated with New GBW-Style Adjusted	Shiller GBW-Hybrid	Average Value of 1-Family Building Permits
1920	76.9	71.9	72.1	89.6		83.5	78.1	78.4	97.3	
1921	88.5	83.9	84.0	98.1	74.4	103.1	97.7	97.8	114.3	86.7
1922	96.3	92.0	92.0	106.1	85.1	108.2	103.3	103.3	119.2	95.6
1923	98.8	95.4	94.8	105.7	82.2	98.8	95.3	94.8	105.7	82.1
1924	101.2	98.0	97.6	105.7	85.0	100.7	97.5	97.2	105.2	84.6
1925	101.5	98.4	98.1	108.3	87.6	100.3	97.1	96.9	107.0	86.5
1926	101.5	99.3	99.1	103.1	90.1	96.0	94.0	93.8	97.6	85.3
1927	101.9	100.2	100.2	101.2	93.1	96.6	95.0	95.0	95.9	88.3
1928	103.3	101.9	102.0	103.9	96.3	98.0	96.7	96.7	98.6	91.3
1929	101.4	100.6	100.6	101.8	96.0	90.6	89.9	89.9	91.0	85.8
1930	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1931	102.9	102.0	100.8	100.9	106.4	112.5	111.5	110.2	110.3	116.3
1932	104.4	103.5	100.7	100.6	95.9	134.4	133.3	129.7	129.6	123.4
1933	109.6	106.7	104.0	102.2	99.5	140.2	136.5	133.0	130.7	127.2
1934	108.0	98.8	100.3	101.6	101.7	123.1	112.6	114.3	115.7	115.9
1940		87.7	76.7	113.9	92.8		71.5	62.5	92.8	75.7
Max	109.6	106.7	104.0	108.3	106.4	140.2	136.5	133.0	130.7	127.2
Maximum Year	1933	1933	1933	1925	1931	1933	1933	1933	1933	1933
Growth Rate 1920 to Max	42.6	48.5	44.2	20.9	43.0*	67.9	74.8	69.7	34.3	46.8
Growth Rate 1920 to 1920s peak	34.5	41.7	41.3	20.9	34.5	29.5	32.3	31.8	22.5	

Sources: See Table 7 for nominal values. CPI is based on 1935-1939 budgets and then adjusted so that 1930 value =100. It comes from U.S. Bureau of Labor Statistics (1941a, 36, 44). Gross Domestic Product per Capita (GDP per capita) is series Ca12 in Sutch (2006, 3-25).

Figure 1
Multi-City Estimates of Housing Values, Prices, and Rents
(1930 Value=100)

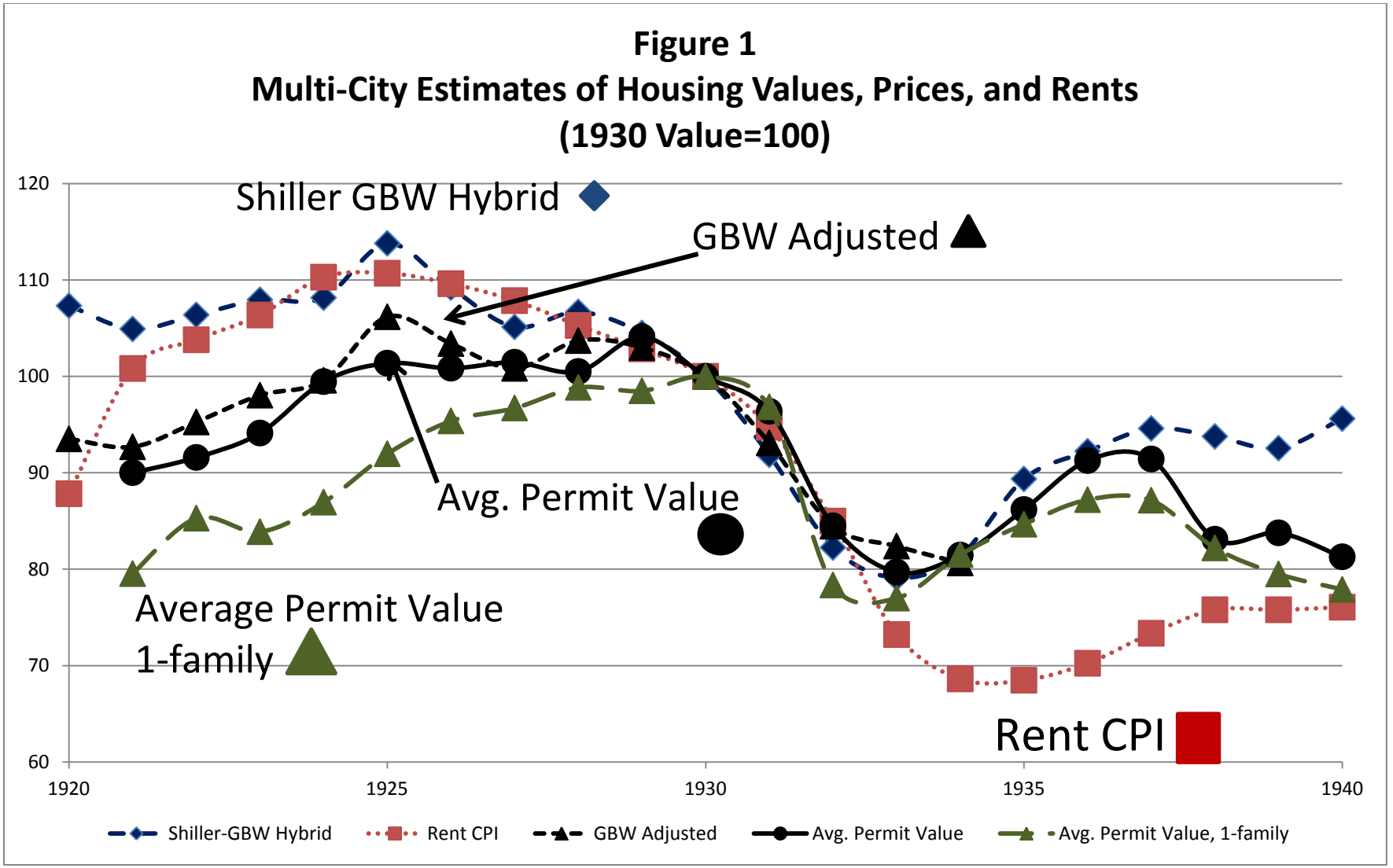

Figure 2

Time Series of Housing Price Estimates for Different Cities

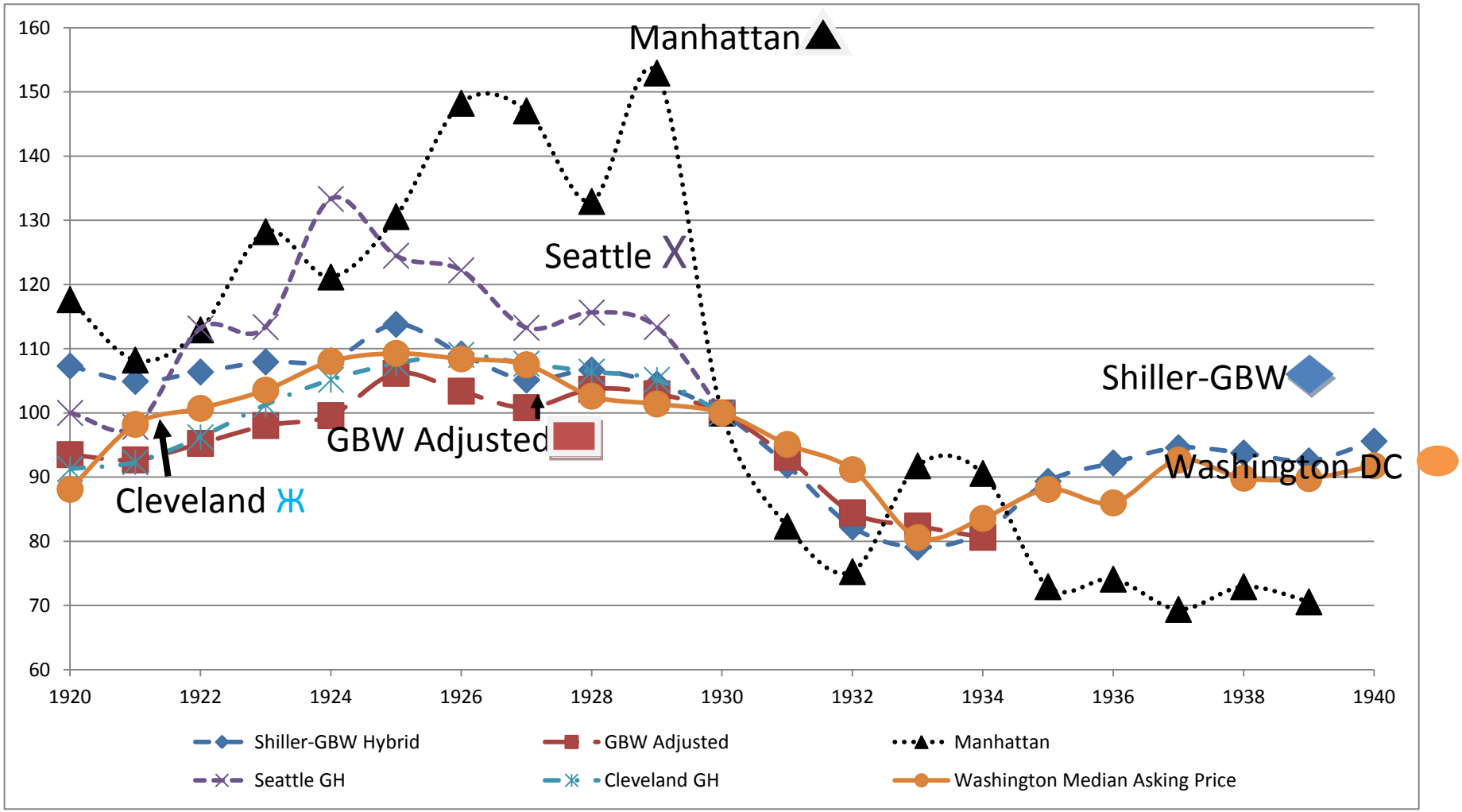

Figure 3
Median Values and Various Sale Price Indices from 2000 to 2011
(2000 Value=100)

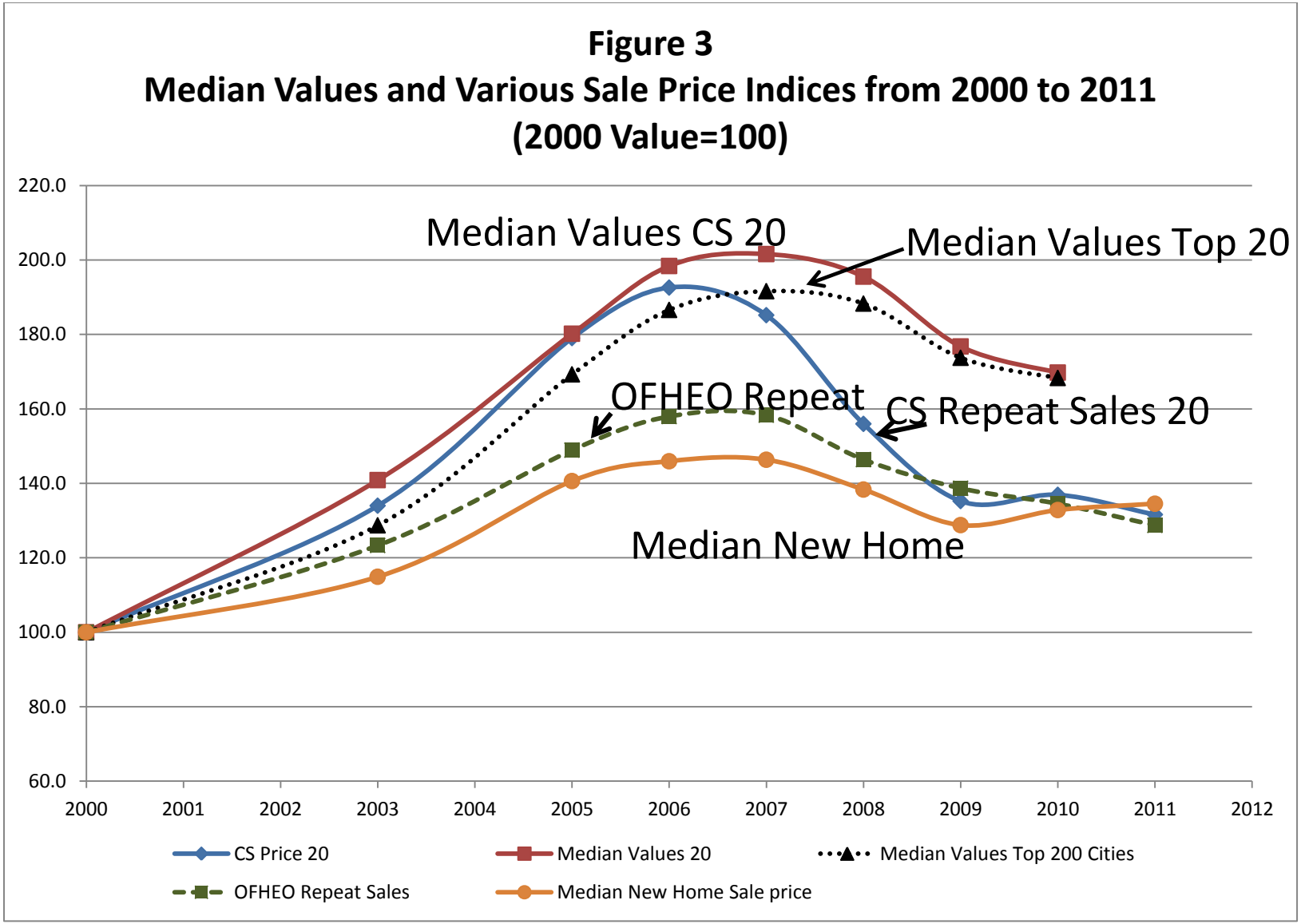

Figure 4
Home Value Indices, 1920-1940 (1930=100)

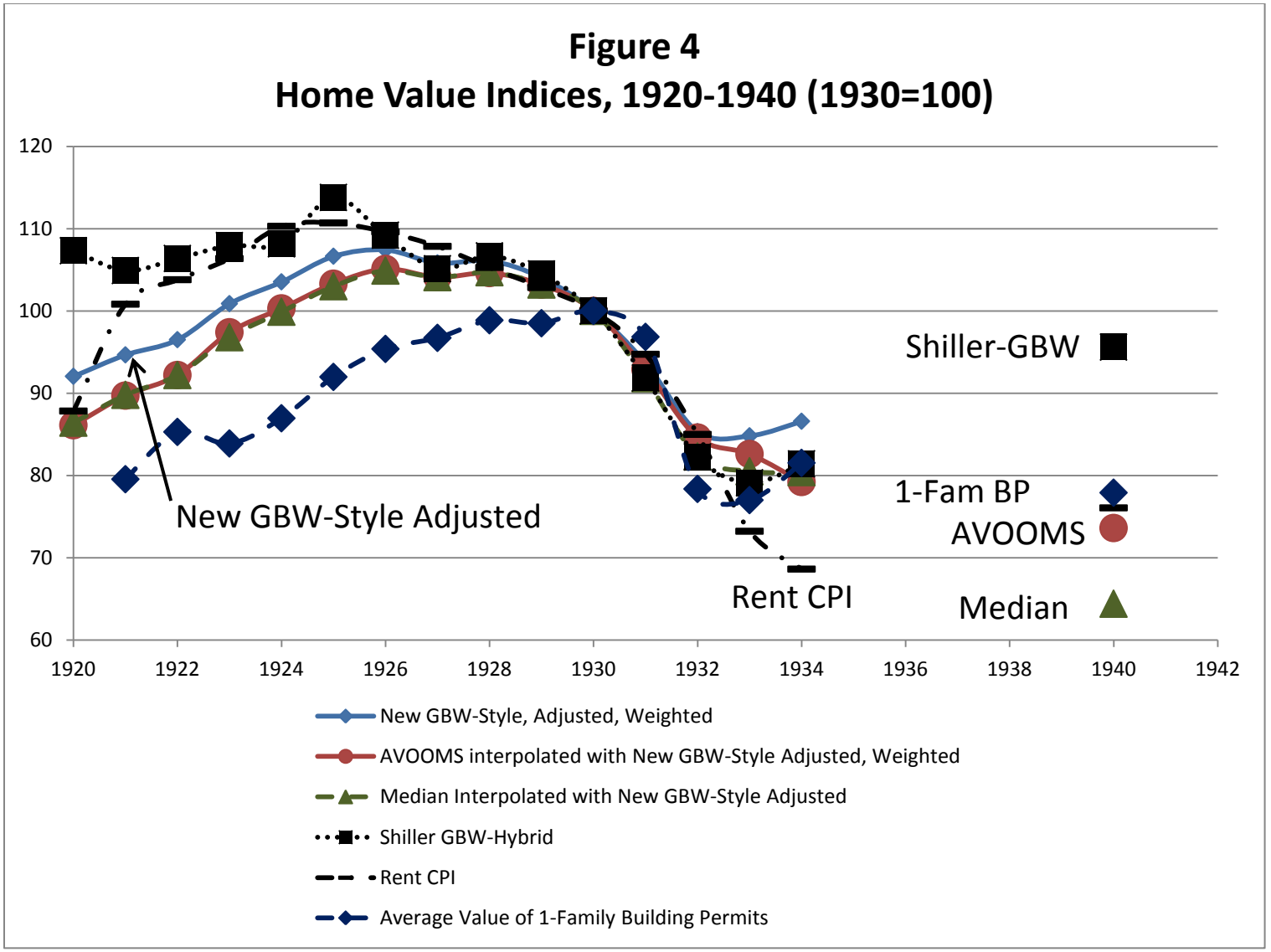

Figure 5
Home Values Adjusted for CPI Inflation, 1920-1940 (1930=100)

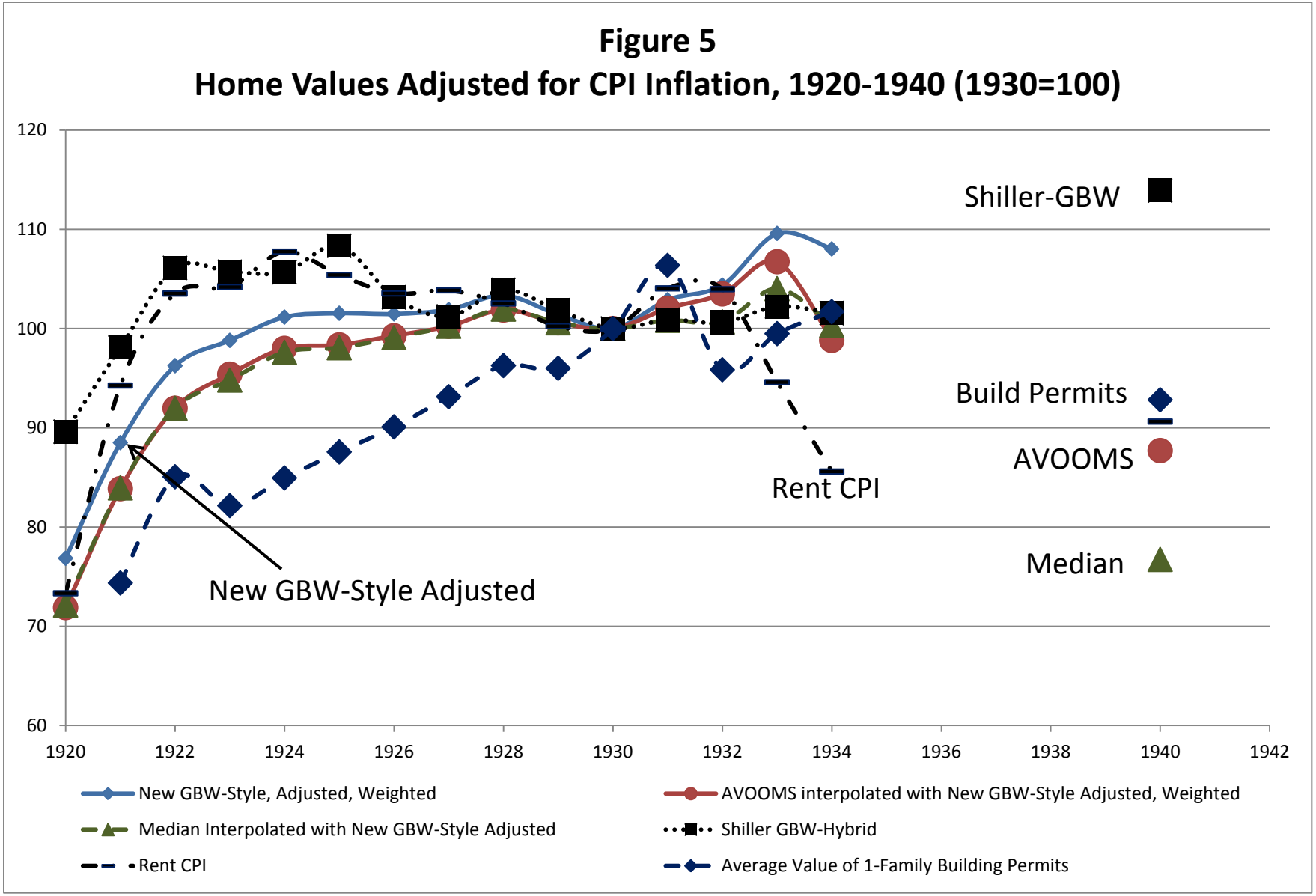

Figure 6
Home Values Relative to GDP Per Capita, 1920-1940, (1930=100)