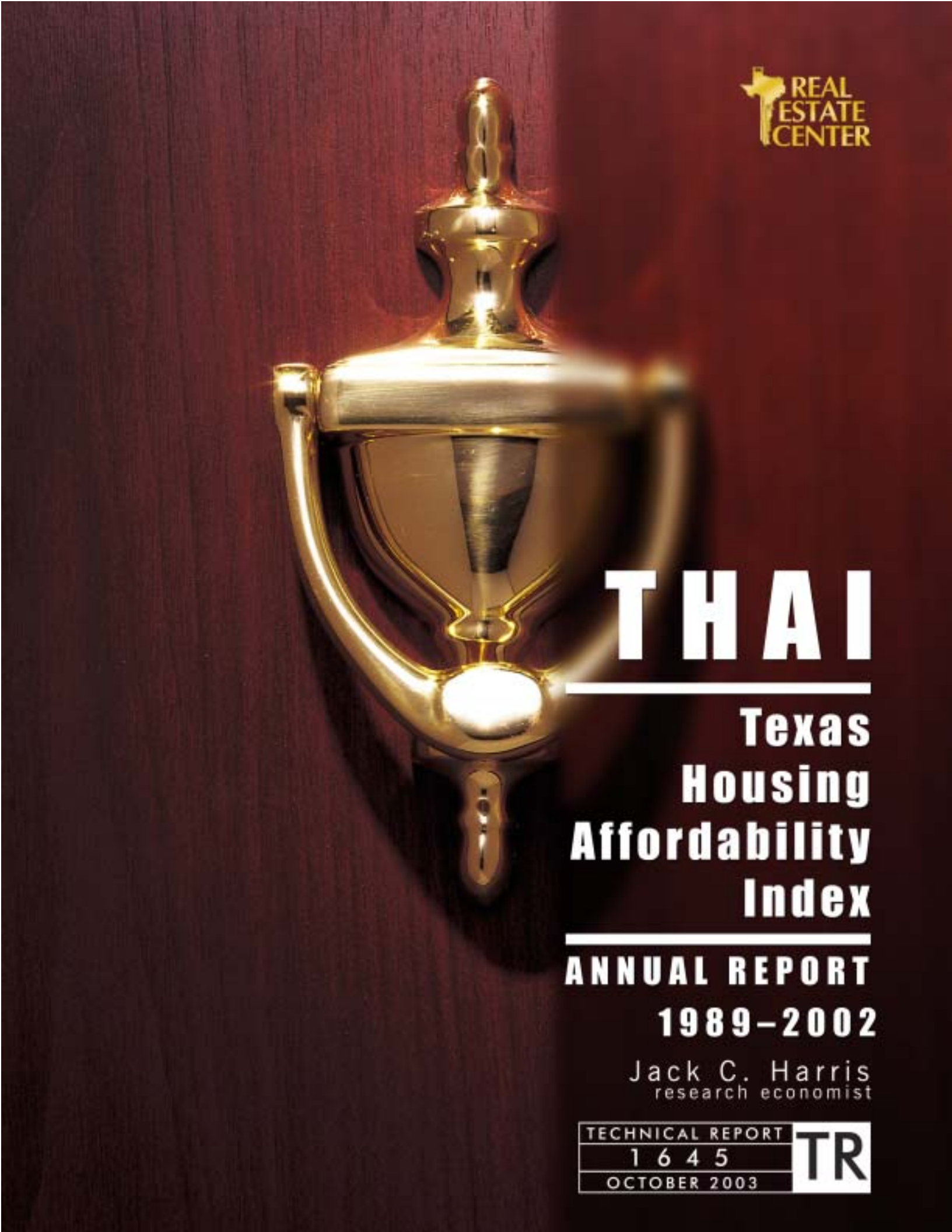

REAL ESTATE CENTER

THAI

Texas Housing Affordability Index

ANNUAL REPORT 1989–2002

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research economist

TECHNICAL REPORT
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Texas Housing Affordability Index Annual Report, 1989–2002

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Contents

The Texas Housing Affordability Index (THAI; Table 1) monitors how affordable it is for local residents to buy a home at current prices and interest rates. Comparing index values for different periods indicates whether market conditions are becoming more or less favorable for homebuyers.

THAI values are provided for all local markets in Texas that report price data to the Real Estate Center. While other affordability measures report on some Texas cities, the THAI covers all but a few Texas metropolitan markets. The most recent values are reported on a quarterly basis in the data section of the Real Estate Center's website, http://recenter.tamu.edu/data/dataaffd.html.

This publication provides annual indicators for 1989–2002 and describes the methodology and data sources used to construct the index. Past values for many market areas have been revised as more complete data became available.

Measuring Affordability

Housing affordability refers to both purchasing a home and being able to afford maintenance expenses. Because maintenance costs are difficult to estimate accurately, most affordability measures, including the THAI, focus on the initial purchase.

Homebuyers must satisfy a mortgage lender's requirements to be approved for financing. Buyers also must have adequate cash for a down payment and closing costs, plus any moving expenses. However, the personal wealth data needed to measure ability to meet these expenses are not available on either a timely or local basis, thus limiting the scope of any practical affordability measure to the issue of mortgage loan qualifying.

Consequently, the THAI and similar indexes are patterned on lenders' qualifying criteria based on borrowers' income. Lenders require borrowers to have sufficient verifiable income to service mortgage debt with enough leeway for other reasonable living expenses. Basically, **the THAI measures how adequately the typical household income meets the criteria necessary to qualify for a loan to buy the typical home sold in the local market**. The formula for the THAI is:

$$\frac{\text{Median household monthly income} \times \text{Qualifying ratio}}{\text{Monthly mortgage payment}}$$

The qualifying ratio is applied by mortgage loan underwriters to determine the largest loan borrowers can obtain given their income. Most conventional mortgage loans have a qualifying ratio of 28 percent, and this ratio is used to calculate the THAI (Appendix A). Loan payments are based on current mortgage interest rates (using the average interest rate on all mortgage loans closed during the last five days of each month).

Here is an example of how the statewide index was calculated for 2002. The median house price was $124,900, requiring a loan amount of $99,920 (80 percent). At 6.61 percent interest, a 30-year loan had monthly principal and interest payments of $638.81. The total payment — principal, interest, taxes and insurance (PITI) — was estimated to be $942.73. Median household gross income was an estimated $42,030, or $3,502.50 per month. Lenders would allow 28 percent, or $980.70, to cover the monthly payments. In this case, dividing qualifying income by the payment resulted in a THAI of 1.04.

When the median household has exactly enough income to qualify for the median-priced home, the index has a value of 1.00. **Index values less than 1.00 signal that homes are less affordable and that home purchase is difficult for most households. Conversely, values more than 1.00 indicate relatively affordable housing**. These interpretations are most valid when tracking THAI values over time for any one market area. Comparisons between different market areas are less meaningful.

The THAI value at any one time in a locality reflects not only housing market conditions but the way income is distributed among resident households. If significant segments of the population do not participate actively in the housing market (for example, college students in major university towns), THAI values tend to be unrealistically low. Therefore, **comparative THAI values do not necessarily indicate whether houses are more affordable in one area than another**.

Data Sources

Calculating the THAI requires data on resident income, current mortgage interest rates and local house prices. THAI income data are supplied by Market Statistics, Inc. The actual statistic used is called effective buying income (EBI), an estimate of disposable, or after-tax, income. Each September, an estimate of median household EBI as of the end of the previous year is reported for each metropolitan area and county in the country. The annual THAI values shown in the tables are based on the average of the EBI reported at the beginning and end of each year. For quarterly calculations, EBI is extrapolated from the previous year's value. Estimates of gross income are derived from EBI data, in conjunction with current reports of median household money income issued by the U.S. Census Bureau (Appendix B).

Mortgage interest rates are provided by the Federal Housing Finance Board's interest rate survey. Quarterly data are available for the Dallas-Fort Worth and Houston metropolitan areas, as well as for the Federal Home Loan Bank District that contains Texas (annual rates are reported by state). As a matter of expediency, all areas outside the Dallas-Fort Worth and Houston areas are assumed to have interest rates equal to the district average (annual figures are available for Austin-San Marcos, San Antonio and the state). It is assumed, for the regular THAI, that borrowers can obtain financing at the standard 80 percent loan-to-value ratio and 30-year term. The interest rate used is the weighted average of fixed- and adjustable-rate loans according to how many of each type loan is closed in each market. In addition, the formula uses the average contract rate of interest to calculate the amount of the monthly payment.

Housing price is the median sales price as reported by area boards or associations of Realtors. Because median prices are unavailable prior to 1989, the historical series of THAI values cannot be extended to earlier years. Where THAI values are not reported in the table (indicated by "–"), insufficient median price data were available to calculate the indicator.

Additional Indicators

In addition to the THAI, other indicators provide insights into affordability conditions. Therefore, for each city included in the survey an estimate is provided of the percentage of households in the area that can afford the typical home. In addition, a "first-time homebuyer" affordability index, or FTHAI, is calculated for each area. This index is described following the tables.

A THAI of 1.00 means that half of the households in the area could qualify, on the basis of income, to buy the median-priced home. However, THAI values are usually higher or lower than 1.00, and the interpretation of those values is not straightforward.

For example, a THAI value of 1.04 means that more than half of area households can afford a median-priced home. To know how many households could qualify for a median-priced home, it is necessary to know the distribution of area income. The annual *Survey of Buying Power* provides information on the distribution of EBI, in addition to the median for households. Appendix C describes how these data are used to estimate the percentage of households that can afford the median-priced home in each area. The percentages for each year are reported in Table 2.

Table 1. Texas Housing Affordability Index: 1989–2002

Area*	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Abilene	1.40	1.88	2.04	1.88	1.72	1.59	1.65	1.61	1.58	1.66	1.61	1.45	1.46	1.58
Amarillo	1.29	1.32	1.34	1.34	1.36	1.35	1.32	1.33	1.34	1.39	1.39	1.21	1.20	1.20
Arlington	1.19	1.31	1.48	1.50	1.61	1.61	1.60	1.62	1.61	1.63	1.63	1.39	1.34	1.29
Austin	–	1.15	1.19	1.19	1.21	1.24	1.25	1.18	1.19	1.23	1.23	1.05	1.16	1.20
Bay Area	–	–	–	–	1.07	1.09	1.13	1.22	1.20	1.25	1.27	1.09	1.04	0.97
Beaumont	1.19	1.28	1.16	1.13	1.23	1.20	1.30	1.27	1.27	1.32	1.29	1.13	1.19	1.17
Brazoria County	1.72	1.77	1.81	1.60	1.71	1.81	1.85	1.74	1.69	1.78	1.93	1.70	1.66	1.60
Brownsville	–	–	–	0.95	0.95	0.97	0.95	0.93	0.99	1.06	1.14	1.03	1.04	0.88
Bryan-College Station	0.91	0.91	0.91	0.90	0.93	0.97	0.92	0.96	1.00	1.04	0.97	0.85	0.81	0.81
Collin County	–	–	–	–	–	1.47	1.39	1.34	1.42	1.44	1.50	1.34	1.35	1.32
Corpus Christi	1.09	1.18	1.24	1.31	1.34	1.29	1.32	1.34	1.33	1.38	1.33	1.20	1.21	1.17
Dallas	0.87	0.94	1.02	1.08	1.19	1.25	1.27	1.23	1.22	1.23	1.28	1.13	1.15	1.09
Denton	–	–	–	–	1.69	1.64	1.54	1.43	1.34	1.35	1.39	1.17	1.21	1.27
El Paso	0.99	1.02	1.07	1.14	1.20	1.18	1.15	1.17	1.20	1.29	1.27	1.14	1.11	1.13
Fort Bend County	–	–	–	–	1.88	1.80	1.81	1.79	1.71	1.73	1.65	1.45	1.33	1.21
Fort Worth	1.15	1.30	1.38	1.48	1.52	1.58	1.63	1.63	1.61	1.55	1.52	1.34	1.30	1.19
Galveston	1.11	1.09	0.97	1.02	1.01	1.06	1.05	1.09	1.13	1.07	1.13	0.92	–	–
Garland	–	–	–	–	–	1.99	2.02	1.97	1.98	1.97	1.84	1.64	1.52	–
Harlingen	1.17	1.20	–	–	–	–	1.24	1.24	1.26	1.24	1.18	1.00	1.16	–
Houston	1.11	1.17	1.15	1.16	1.30	1.37	1.42	1.42	1.37	1.40	1.42	1.20	1.21	1.09
Irving	1.05	1.06	1.09	1.14	1.17	1.26	1.27	1.21	1.43	1.43	1.64	1.46	1.46	1.33
Killeen-Ft. Hood	–	–	–	–	1.47	1.42	1.44	1.40	1.45	1.58	1.61	1.52	1.56	1.54
Longview	1.19	1.22	1.28	1.24	1.33	1.32	1.28	–	1.25	1.36	1.33	1.27	1.30	–
Lubbock	1.12	1.19	1.21	1.28	1.33	1.34	1.35	1.36	1.34	1.41	1.31	1.14	1.19	1.14
Lufkin	–	–	1.45	1.41	1.57	1.58	1.50	1.36	1.40	1.40	1.41	1.30	1.26	1.36
McAllen	–	–	–	0.99	0.98	1.00	0.95	0.93	1.02	1.00	1.01	0.92	–	–
Montgomery County	–	–	–	–	1.40	1.42	1.42	1.37	1.25	1.34	1.34	1.19	1.24	1.21
Nacogdoches	–	–	–	–	–	–	–	1.20	1.24	–	–	–	–	–
Northeast Tarrant County	1.30	1.47	1.55	1.49	1.59	1.55	1.51	1.47	1.45	1.48	1.46	1.24	1.23	1.18
Odessa-Midland	1.33	1.30	1.27	1.27	1.40	1.44	1.41	1.41	1.42	1.53	1.56	1.48	1.47	1.46
Palestine	–	–	–	1.91	1.89	1.73	1.94	1.95	1.82	1.82	1.69	–	–	–
Paris	–	–	–	–	–	–	1.53	1.61	1.49	1.70	1.56	1.31	1.35	1.34
Port Arthur	1.24	1.30	1.10	0.94	1.14	1.26	1.41	1.41	1.46	1.72	1.82	1.67	1.65	1.69
San Angelo	1.31	1.43	1.39	1.52	1.56	1.53	1.59	1.56	1.54	1.52	1.45	1.32	1.32	1.33
San Antonio	1.16	1.22	1.20	1.19	1.24	1.30	1.32	1.27	1.28	1.36	1.39	1.24	1.26	1.21
San Marcos	–	–	–	–	–	–	1.31	1.28	1.40	1.45	1.59	1.48	–	–
Sherman-Denison	1.29	1.45	1.63	1.67	1.75	1.84	1.70	1.69	1.59	1.62	1.56	1.44	1.37	1.76
Temple-Belton	1.10	1.12	1.18	1.27	1.31	1.33	1.22	1.24	1.25	1.38	1.40	1.17	1.25	–
Texarkana	1.26	1.32	1.42	1.46	1.56	1.43	1.51	1.45	–	–	–	–	–	–
Tyler	–	1.23	1.17	1.19	1.31	1.22	1.25	1.27	1.21	1.33	1.35	1.22	1.22	1.20
Victoria	1.39	1.44	1.44	1.46	1.52	1.50	1.57	1.62	1.56	1.63	1.54	1.36	1.38	1.31
Wichita Falls	1.32	1.46	1.49	1.63	1.65	1.57	1.55	1.66	1.56	1.60	1.55	1.39	1.37	1.34
Texas Metros	**1.09**	**1.15**	**1.18**	**1.21**	**1.28**	**1.28**	**1.29**	**1.28**	**1.26**	**1.32**	**1.26**	**1.07**	**1.09**	**1.04**
United States	**0.90**	**0.91**	**0.92**	**1.02**	**1.10**	**1.07**	**1.05**	**1.03**	**1.00**	**1.01**	**1.07**	**1.04**	**1.03**	**1.06**

Source: Real Estate Center at Texas A&M University
*see Table B3
Note: "–" indicates insufficient data to calculate index

Table 2. Percentage of Households That Can Afford Median-Priced Home (20 Percent Down Payment): 1989–2002

Area*	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Abilene	65.8	75.9	78.3	75.8	73.0	69.7	71.2	69.2	68.8	70.4	69.6	66.5	66.8	72.8
Amarillo	61.4	62.9	57.3	63.2	63.2	63.1	61.9	62.8	63.1	64.2	64.4	59.4	59.0	60.5
Arlington	58.5	63.2	69.7	70.4	72.9	72.3	72.3	72.6	72.2	72.6	72.7	66.0	63.7	65.0
Austin	–	56.4	57.9	58.7	57.9	59.3	59.8	57.4	57.7	58.4	58.8	52.0	56.1	59.0
Bay Area	–	–	–	–	51.6	53.4	54.1	58.1	57.7	58.5	59.5	53.9	52.5	48.1
Beaumont	55.9	59.0	56.1	56.1	58.3	57.4	59.9	59.2	59.6	60.5	60.0	55.8	57.3	58.5
Brazoria County	73.9	74.8	75.8	71.7	73.1	75.0	76.0	73.9	72.7	73.7	76.8	72.9	72.2	72.3
Brownsville	–	–	–	47.9	47.1	48.7	48.3	46.7	49.6	51.1	55.1	51.4	52.4	45.4
Bryan-College Station	46.8	47.0	45.6	46.4	47.2	46.5	46.6	49.1	50.2	51.7	49.2	44.6	42.4	42.5
Collin County	–	–	–	–	–	69.2	76.2	64.4	67.5	67.8	69.5	65.0	65.4	66.4
Corpus Christi	53.2	57.1	59.0	61.4	62.2	60.5	61.0	61.9	61.8	62.9	61.7	58.3	58.6	58.2
Dallas	42.7	47.0	51.4	54.1	57.3	60.3	61.2	59.6	59.0	57.9	60.8	55.9	57.0	55.5
Denton	–	–	–	–	73.1	72.0	70.0	66.5	63.5	63.0	65.0	58.2	59.2	62.8
El Paso	49.3	50.8	53.0	56.8	58.5	57.5	57.1	57.6	58.3	61.2	60.6	56.9	56.1	57.3
Fort Bend County	–	–	–	–	78.7	77.2	77.3	76.1	74.7	75.3	73.4	69.4	65.9	61.2
Fort Worth	56.1	61.3	63.9	67.4	68.3	68.9	70.0	69.8	69.5	68.5	67.5	62.9	62.4	60.5
Galveston	54.1	54.0	49.6	51.1	50.1	52.3	51.5	53.2	55.0	52.7	55.2	55.6	–	–
Garland	–	–	–	–	–	81.6	81.8	81.0	81.3	81.2	78.8	73.8	–	–
Harlingen	58.5	59.3	–	–	–	–	58.0	58.2	58.7	58.3	56.6	51.5	56.6	–
Houston	55.2	57.6	57.0	57.2	61.3	63.7	65.0	65.1	63.8	63.5	64.5	58.1	58.8	55.3
Irving	52.7	53.6	56.8	57.7	58.9	62.3	62.4	60.0	68.3	68.5	73.9	69.0	68.2	69.1
Killeen-Ft. Hood	–	–	–	–	71.1	69.5	70.1	67.6	69.1	72.3	73.1	71.8	73.7	76.4
Longview	57.1	58.0	60.9	59.4	61.4	60.9	60.0	100.0	59.2	62.1	61.6	60.3	61.4	–
Lubbock	55.3	58.2	59.0	60.8	62.2	62.0	62.4	62.6	62.1	63.8	61.3	56.6	57.9	58.3
Lufkin	–	–	64.8	64.7	67.8	67.7	66.5	62.7	63.9	63.4	64.1	61.6	60.8	65.1
McAllen	–	–	–	49.3	49.1	50.1	49.5	46.7	50.7	49.5	50.1	47.5	–	–
Montgomery County	–	–	–	–	64.5	65.3	65.4	63.5	59.8	61.9	62.5	57.6	59.9	59.3
Nacogdoches	–	–	–	–	–	–	–	56.2	57.2	–	–	–	–	–
Northeast Tarrant County	60.0	57.1	77.4	71.0	72.3	71.6	71.4	69.2	65.5	69.3	69.5	61.8	61.1	59.2
Odessa-Midland	61.5	62.4	62.2	60.8	63.9	65.2	65.1	64.8	65.3	67.3	68.1	66.6	66.7	69.1
Palestine	–	–	–	74.2	73.6	70.4	73.6	73.4	71.4	71.7	69.2	–	–	–
Paris	–	–	–	–	–	–	64.8	67.2	64.5	69.3	65.7	60.3	61.3	62.4
Port Arthur	58.2	60.0	56.0	48.1	52.8	58.2	61.8	63.5	64.6	67.7	71.2	68.4	68.4	69.5
San Angelo	62.3	65.7	64.5	68.7	69.1	68.1	69.8	68.5	68.2	67.9	66.1	63.5	63.3	65.5
San Antonio	55.4	54.6	57.9	59.0	59.9	61.7	62.4	61.0	61.4	63.0	64.4	60.2	60.8	60.0
San Marcos	–	–	–	–	–	–	59.5	59.5	61.2	61.3	65.3	64.18	–	–
Sherman-Denison	61.2	65.9	70.2	70.8	71.7	72.9	70.5	70.1	68.2	69.3	68.0	65.2	63.9	71.6
Temple-Belton	54.3	55.1	57.2	60.1	60.7	61.1	58.6	58.7	59.1	62.2	63.0	58.1	59.6	–
Texarkana	60.3	62.1	64.8	63.4	65.7	62.2	64.2	62.3	–	–	–	–	–	–
Tyler	–	58.9	57.2	58.3	61.8	58.9	59.3	60.5	57.0	62.2	62.8	59.0	59.1	59.6
Victoria	63.8	65.5	65.6	64.9	66.1	65.3	66.6	67.6	68.6	68.1	66.4	62.5	63.6	62.8
Wichita Falls	62.5	66.9	67.4	70.4	70.8	68.5	67.9	70.0	65.8	68.9	68.0	64.7	64.2	65.0
Texas Metros	**54.0**	**56.5**	**57.6**	**59.2**	**61.2**	**60.7**	**61.2**	**60.8**	**60.1**	**61.9**	**59.9**	**53.1**	**54.1**	**52.9**
United States	**45.2**	**45.8**	**40.0**	**50.5**	**53.4**	**52.3**	**60.3**	**47.2**	**50.3**	**48.5**	**52.3**	**52.0**	**51.4**	**52.8**

Source: Real Estate Center at Texas A&M University

*see Table B3

Note: "–" indicates insufficient data to calculate index

First-Time Homebuyer Affordability Index

A housing affordability index is probably more appropriate for first-time homebuyers than for the public, because the first-time buyer usually faces the biggest affordability obstacle: accumulating the cash required to make the purchase. Repeat buyers often have the proceeds from the sale of previous residences to cover the down payment and closing costs. Therefore, most first-time buyers must obtain financing for almost the entire cost of the home, which not only increases the amount of the loan but also adds the cost of mortgage insurance premiums. First-time buyers usually have lower incomes than repeat buyers, and they often purchase lower-priced homes.

The First Time Homebuyer Affordability Index (FTHAI) attempts to capture these differences. The index is formulated and can be interpreted like the general THAI. That is, the FTHAI has a value of 1.00 when the median income of non-homeowning households is exactly adequate to purchase the median-priced "starter" home. For the FTHAI, median income is based on renter households. The median home price is an estimate of the sales price of a modest-sized home. Financing used is an FHA-insured, 95 percent loan-to-value mortgage loan.

For the FTHAI, the following assumptions apply:

- First-time homebuyers face the same mortgage market as any other homebuyer. In other words, although there are special mortgage programs aimed at first-time buyers that offer below-market interest rates, the terms available through these programs are not reflected in the index. Such programs usually have requirements in addition to being a first-time homeowner, such as income limits and restrictions on where the house is located. Also, the programs are limited in size and not available at all times and in every area. The index does incorporate the low Up Front Mortgage Insurance Premium (UFMIP) available through FHA for first-time homebuyers, under the assumption that homebuyers comply with the stipulations for obtaining this lower premium.
- Financing is an FHA-insured, 30-year mortgage loan for 95 percent of the home's cost originated at the average contract interest rate on loans closed during the period. The UFMIP required by the FHA is financed into the loan. These loans require a monthly insurance premium equal to one-half percent of the outstanding balance, spread out evenly over 12 monthly payments. The FHA income-to-mortgage payment ratio (currently .29) is used in the FTHAI formula.
- First-time homebuyers purchase a moderate-sized, "starter" home. Estimates of the current market price of such homes assume that the relationship of the price of these homes to home prices in general is the same locally as it is nationally. The ratio of median price of a typical starter home with 1,000 to 1,500 square feet of interior space to overall median price is calculated from data in the American Housing Survey (AHS) for the year closest to the year of the FTHAI being calculated. This ratio is then applied to the median price of homes in the local area, as reported by the local MLS. For cities covered by the AHS metropolitan reports (Dallas, Fort Worth, Houston and San Antonio), data from these surveys are substituted for the national ratio.
- The income of the first-time homebuyer is estimated to be the median household income of those households living in rented housing and assumes that the ratio of median renter household income to overall median household income is the same locally as it is nationally. The national ratio can be derived from the Census Bureau's annual report on money income. However, because the distribution of income is different in each locality, the ratio applied to make the estimate is modified using localized data from the 2000 Census of Housing and American Housing Survey, where applicable.

  The formula for the FTHAI, which is patterned after the THAI, is:

  $$.29 \text{ Income / PITI}$$

  where income equals estimated median monthly household income of households living in rented housing units and PITI equals the estimated monthly payment for a loan large enough to purchase the median-priced starter home in the local market. The interest rate used is the average contract mortgage interest rate for the period plus an amount equal to the monthly insurance premium charged by the FHA (0.5 percent per year for 30-year loans for more than 90 percent of value).

The loan used to calculate PITI is equal to 95 percent of the median home price plus the UFMIP charged by the FHA. The following schedule applies to this premium:

FHA UFMIPs

Year	Premium (percent)
1989–92	3.80
1993–95	3.00
1996	2.25
1997	2.00
1998–2000	1.75
2001–2003	1.50

FTHAI values for the years 1989 through 2002 are shown in Table 3. While the THAI has consistently been more than 1.00 during this period, the FTHAI has not. Comparison of the two indexes illustrates the difficulty of purchasing a first home, even during a period of general housing affordability. Household income declines more rapidly at the lower ends of the income distribution than do house prices. At the same time, necessity for mortgage loans that cover almost the entire cost of the house, plus the mortgage insurance premium, further reduces affordability.

The relative level of the FTHAI may provide some indication of the future direction of homeownership rates. If non-homeowners are finding it more difficult to buy, fewer will be successful and homeownership rates could decline. The converse is true if renters find it easier to buy. In addition, by relaxing the requirement that buyers have enough cash to make 20 percent down payments, the FTHAI presents a quite different picture of affordability compared to the somewhat idealized THAI.

Table 3. First-Time Homebuyer Affordability Index: 1989–2002

Area*	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Abilene	1.05	1.41	1.56	1.45	1.50	1.38	1.34	1.14	1.13	1.44	1.39	1.22	1.34	1.40
Amarillo	0.98	1.00	1.04	1.04	1.13	1.13	1.03	0.91	0.92	1.12	1.11	0.94	1.02	0.98
Arlington	0.75	0.84	0.97	0.99	1.16	1.13	1.11	0.99	1.02	1.24	1.28	1.10	1.15	1.07
Austin	–	0.84	0.89	0.90	1.00	1.03	0.97	0.79	0.81	1.00	0.99	0.82	0.98	0.98
Bay Area	–	–	–	–	0.94	0.93	0.95	0.88	0.87	1.00	1.02	0.84	0.87	0.79
Beaumont	0.85	0.92	0.85	0.84	1.01	0.98	0.99	0.84	0.86	1.06	1.03	0.88	1.00	0.95
Brazoria County	1.62	1.64	1.67	1.43	1.52	1.57	1.59	1.29	1.25	1.45	1.58	1.34	1.42	1.34
Brownsville	–	–	–	0.77	0.79	0.80	0.73	0.63	0.68	0.80	0.86	0.75	0.82	0.68
Bryan-College Station	0.65	0.65	0.66	0.66	0.71	0.68	0.66	0.60	0.64	0.75	0.69	0.59	0.61	0.59
Collin County	–	–	–	–	–	0.64	0.60	0.52	0.57	1.32	1.04	1.07	1.17	–
Corpus Christi	0.86	0.92	0.99	1.05	1.17	1.12	1.07	0.95	0.96	1.16	1.21	0.98	1.07	1.01
Dallas	0.67	0.72	0.85	0.91	1.13	1.15	1.15	1.01	1.03	1.27	1.18	1.03	1.12	1.03
Denton	–	–	–	–	1.49	1.39	1.29	1.09	1.05	1.22	1.13	0.93	1.05	1.05
El Paso	0.75	0.77	0.83	0.89	1.01	0.99	0.90	0.81	0.83	1.05	1.02	0.89	0.94	0.93
Fort Bend County	–	–	–	–	1.52	1.41	1.40	1.20	1.14	1.26	1.20	1.02	1.01	0.90
Fort Worth	0.76	0.87	0.95	1.03	1.19	1.20	1.23	1.09	1.12	1.32	1.33	1.17	1.23	1.08
Galveston	0.99	0.96	0.85	0.87	0.96	0.98	0.96	0.85	0.89	1.04	1.08	0.86	–	–
Garland	–	–	–	–	–	1.87	1.88	1.66	1.72	2.05	1.72	1.50	1.51	–
Harlingen	0.87	0.89	–	–	–	–	0.98	0.86	0.88	1.04	1.11	0.85	1.07	–
Houston	1.00	1.04	1.02	0.99	1.18	1.21	1.24	1.07	1.04	1.25	1.26	1.03	1.13	0.99
Irving	0.96	0.98	1.08	1.15	1.34	1.39	1.38	1.19	1.46	1.78	1.82	1.60	1.72	1.52
Killeen-Ft. Hood	–	–	–	–	1.49	1.44	1.36	1.16	1.21	1.56	1.56	1.49	1.65	1.58
Longview	0.91	0.93	1.00	0.97	1.13	1.12	1.02	–	0.88	1.13	1.10	1.01	1.12	–
Lubbock	0.77	0.82	0.85	0.90	1.06	1.07	1.00	0.89	0.89	1.13	1.05	0.89	1.00	0.93
Lufkin	–	–	1.07	1.05	1.27	1.28	1.13	0.90	0.94	1.10	1.11	0.99	1.04	1.09
McAllen	–	–	–	0.79	0.82	0.84	0.74	0.63	0.71	0.79	0.79	0.70	–	–
Montgomery County	–	–	–	–	1.22	1.22	1.20	0.99	0.91	1.08	1.09	0.93	1.05	1.00
Nacogdoches	–	–	–	–	–	–	–	0.71	0.75	–	–	–	–	–
Northeast Tarrant County	0.96	1.10	1.19	1.16	1.21	1.14	1.10	0.95	0.97	1.06	0.97	1.12	1.19	1.11
Odessa-Midland	0.99	0.97	0.96	0.97	1.15	1.19	1.08	0.95	0.97	1.21	1.23	1.14	1.23	1.19
Palestine	–	–	–	1.72	1.75	1.61	1.67	1.47	1.39	1.56	1.44	–	–	–
Paris	–	–	–	–	–	–	1.16	1.07	1.01	1.36	1.24	1.02	1.13	1.09
Port Arthur	0.98	1.02	0.89	0.77	0.96	1.07	1.11	0.97	1.02	1.35	1.08	1.29	1.37	1.36
San Angelo	1.05	1.14	1.13	1.25	1.37	1.35	1.31	1.12	1.13	1.29	1.22	1.09	1.18	1.15
San Antonio	0.89	0.93	0.95	1.00	1.18	1.21	1.22	1.03	1.07	1.35	1.07	1.02	1.10	1.03
San Marcos	–	–	–	–	–	–	1.06	0.91	1.01	1.18	0.93	0.95	–	–
Sherman-Denison	1.00	1.12	1.29	1.33	1.52	1.60	1.37	1.20	1.15	1.38	1.32	1.19	1.23	1.17
Temple-Belton	0.85	0.86	0.93	1.01	1.16	1.18	1.00	0.89	0.91	1.21	1.22	0.99	1.16	–
Texarkana	0.94	0.98	1.08	1.12	1.24	1.14	1.12	0.94	–	–	–	–	–	–
Tyler	–	0.90	0.87	0.89	1.09	1.02	0.97	0.86	0.83	1.10	1.10	0.97	1.04	0.99
Victoria	0.99	1.02	1.04	1.06	1.25	1.24	1.21	1.09	1.06	1.36	1.28	1.10	1.21	1.11
Wichita Falls	0.99	1.10	1.15	1.26	1.46	1.39	1.28	1.19	1.14	1.43	1.38	1.21	1.29	1.22
Texas Metros	**0.88**	**0.93**	**0.97**	**1.00**	**1.11**	**1.11**	**1.05**	**0.90**	**0.91**	**1.13**	**1.08**	**0.89**	**0.98**	**0.91**
United States	**0.65**	**0.65**	**0.66**	**0.72**	**0.78**	**0.76**	**0.74**	**0.73**	**0.71**	**0.70**	**0.86**	**0.73**	**0.83**	**0.77**

Source: Real Estate Center at Texas A&M University
*see Table B3
Note: "–" indicates insufficient data to calculate index

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Appendix A
Support for THAI Equation

Mortgage lenders, when underwriting conventional mortgage loans, commonly apply the ratios mandated by the Federal national Mortgage Association for loans purchased by that agency. This means that a borrower with relatively little long-term debt can qualify for a loan if the payments are no more than 28 percent of monthly income. This ratio is periodically, though infrequently, adjusted according to lenders' experience with borrower default rates. For loan qualifying purposes, the monthly payment includes the tax and insurance escrow payment as well as loan principal and interest payments (PITI). Principal and interest payments are dictated by the loan amount, interest rate and term. However, the escrow portion of the payment must be estimated.

Current property tax effective rates were derived from information compiled by the Property Tax Division of the Texas Comptroller's Office. Likewise, hazard insurance rates were derived from the rates published by the Texas Department of Insurance. These rates are combined to estimate the annual costs of these two expenses as a percentage of current property value. These rates, as applied to 2001 and 2002 THAI calculations, are shown in A1. Rates for the earliest years are estimated to be 2 percent for all areas. For the intermediate years, a blend of the uniform rate and the current rate is used. The monthly allotment of the annual escrow cost is added to the principal and interest amount (calculated from the interest rate and purchase loan amount) to estimate the required monthly payment (PITI).

Values for the affordability index are calculated by:

$$\text{THAI} = \frac{.28 \text{ Income}}{\text{PITI}}$$

Escrow Rates for 2001–2002

Market Area	Percentage of Value	Market Area	Percentage of Value
Abilene	3.2	Longview	2.6
Amarillo	3.1	Lubbock	3.0
Arlington	3.2	Lufkin	2.8
Austin	2.7	McAllen	3.0
Bay Area	2.9	Montgomery County	3.0
Beaumont	2.7	Nacogdoches	2.7
Brazoria County	3.1	Northeast Tarrant County	2.9
Brownsville	2.7	Odessa-Midland	3.4
Bryan-College Station	2.9	Palestine	3.0
Collin County	2.8	Paris	3.1
Corpus Christi	3.2	Port Arthur	2.6
Dallas	2.7	San Angelo	3.0
Denton	3.2	San Antonio	3.1
El Paso	2.9	San Marcos	2.0
Fort Bend County	2.9	Sherman-Denison	3.2
Fort Worth	3.3	Temple-Belton	2.9
Galveston	2.5	Texarkana	2.8
Garland	2.8	Tyler	2.3
Harlingen	2.7	Victoria	3.1
Houston	2.8	Wichita Falls	3.2
Irving	2.5		
Killeen-Fort Hood	2.8	**Texas Metros**	**2.9**

Appendix B
Household Income Estimates

The equation for housing affordability requires a current measure of median household income for each housing market covered. The housing affordability index calculated by the National Association of Realtors uses median family income, which excludes single-member households, even though such households commonly buy homes. The THAI uses an estimate of household income derived from Effective Buying Income (EBI) estimated by Market Statistics, Inc., a source that is relatively timely and detailed.

End-of-the-year estimates of EBI are reported for each county, metropolitan statistical area and major city in the nation as well as for states and the nation as a whole in the annual *Survey of Buying Power*, published in September of the following year. In addition, estimates of the distribution of EBI are included and are used to estimate the percentage of households that can afford a median-priced home.

EBI is an after-tax, disposable income measure. Mortgage qualifying, and thus THAI, is based on gross income. Therefore, EBI values must be adjusted before inserting them into the equation. As part of its Current Population Survey, the Census Bureau reports median household income for the nation, regions and states. Using these data, it is possible to calculate the ratio of median gross household income to median household EBI for Texas metropolitan areas (Table B1).

Table B1. Ratio of Median Gross Household Income to Median Household EBI

Year	Gross Income	EBI*	Ratio
1989	$25,900	$24,750	1.05
1990	28,200	26,500	1.07
1991	27,700	29,700	0.93
1992	28,000	32,450	0.86
1993	28,700	34,100	0.84
1994	30,800	36,000	0.85
1995	32,000	34,700	0.92
1996	33,100	33,200	1.00
1997	35,100	34,450	1.02
1998	35,800	35,600	1.01
1999	39,000	37,100	1.05
2000	39,700	39,000	1.02
2001	42,100	40,400	1.04
2002	39,500	40,000	0.99

*For a closer comparison to the mid-year gross income measure, the end-of-the-year EBI values were averaged from before and after year numbers.

The fall in the ratio during the middle years of the range was caused by a change in Market Statistics' methodology in 1996, specifically switching from using personal income to calculate EBI to their current use of money income. Both measures are comprehensive income indicators and include employment earnings, income transfers and investment income. Personal income, however, includes non-cash income, such as imputed rent from an owner-occupied home. Money income does not include such income and is the more appropriate measure for THAI purposes. Using the ratios in the table to estimate median household income from EBI compensates for these vagaries in methodology.

The ratio of gross income to EBI is influenced by income distribution because higher income households tend to pay a larger percentage of income in taxes. If all areas were adjusted using only a statewide ratio, some areas would be overestimated and some underestimated. To help reconcile this difference, local adjustment factors were calculated based on median family income in the 1990 Census, which reports income in 1989 and in the 2000 Census for income in 1999. First, the EBI for each area is adjusted by the statewide factor for 1989 or 1999. Then the 1989/1999 income figure reported by the Census is divided by the adjusted EBI. This results in a set of local factors reflecting the difference between local and statewide disposable income adjustment. Factors derived from 1989 data are applied to years 1989–1992 and those from 1999 data are applied to years 1998–2002. A blend of the two factors is used in the other years.

Annual median household gross income for each local area is estimated using the formula:

EBI x *Annual factor* x Local factor.

Annual estimates of income are year-end values. Annual THAI values reported in the tables of this report are based on the average of the current year and previous year income figures. When quarterly THAI values are reported, the year-end income for the current year is not known. The most recent income estimate is projected using a blend of growth in national personal income, rate of change in manufacturing weekly wages and growth in income during the previous year. These data are reported monthly, with a lag of approximately two months.

The *Survey of Buying Power* provides income data for the THAI. Median income and distributions are shown for states, metropolitan areas, counties and selected cities within the metropolitan areas. Table B3 shows the geographic areas covered by THAI.

Table B2. Local Ratios, Gross Income to EBI

Area	1989	1999
Abilene	1.15	1.08
Amarillo	0.98	1.01
Arlington	1.04	1.00
Austin	1.10	1.15
Bay Area	0.89	1.04
Beaumont	0.96	1.00
Brazoria County	0.93	1.08
Brownsville	.9	1.07
Bryan-College Station	.96	.97
Collin County	1.08	1.14
Corpus Christi	1.06	1.02
Dallas	.91	1.02
Denton	1.05	1.13
El Paso	1.09	1.06
Fort Bend County	1.16	1.01
Fort Worth	1.1	.98
Galveston	.94	1.05
Garland	1.03	.92
Harlingen	1.14	.97
Houston	.89	.97
Irving	.99	.97
Killeen-Fort Hood	1.18	1.18
Longview	1.0	1.02
Lubbock	1.09	.99
Lufkin	.96	1.08
McAllen	1.06	1.09
Montgomery County	1.05	1.08
Nacogdoches	1.08	1.03
Northeast Tarrant County	1.08	1.05
Odessa-Midland	.94	1.03
Palestine	1.14	1.01
Paris	1.09	1.01
Port Arthur	.78	1.37
San Angelo	1.04	1.02
San Antonio	1.02	1.09
San Marcos	1.19	1.19
Sherman-Denison	1.03	1.09
Temple-Belton	1.05	1.13
Texarkana	1.09	1.04
Tyler	.99	.98
Victoria	1.03	.99
Wichita Falls	1.10	1.03

Table B3. THAI Geographical Areas

THAI Area	*Survey of Buying Power* Area
Abilene	Abilene MSA (Taylor County)
Amarillo	Amarillo MSA
Arlington	City of Arlington
Austin	Austin-San Marcos MSA
Bay Area	Galveston County
Beaumont	City of Beaumont
Brazoria	Brazoria MSA (County)
Brownsville	City of Brownsville
Bryan-College Station	Brazos County
Collin County	Collin County
Corpus Christi	Corpus Christi MSA
Dallas	Dallas PMSA*
Denton	Denton County
El Paso	El Paso MSA
Fort Bend County	Fort Bend County
Fort Worth	City of Fort Worth
Galveston	City of Galveston
Garland	City of Garland
Harlingen	City of Harlingen
Houston	Houston PMSA*
Irving	City of Irving
Killeen	City of Killeen
Longview	Longview-Marshall MSA
Lubbock	Lubbock MSA (County)
Lufkin	Angelina County
McAllen-Edinburg-Mission	McAllen-Edinburg-Mission MSA (Hidalgo County)
Montgomery County	Montgomery County
Nacogdoches	Nacogdoches County
Northeast Tarrant County	City of North Richland Hills plus City of Bedford
Odessa-Midland	Odessa-Midland MSA
Palestine	Anderson County
Paris	Lamar County
Port Arthur	City of Port Arthur
San Angelo	San Angelo MSA (Tom Green County)
San Antonio	San Antonio MSA
San Marcos	Hays County
Sherman-Denison	Sherman-Denison MSA (Grayson County)
Temple	City of Temple
Texarkana	Texarkana MSA (Bowie County)
Tyler	Tyler MSA (Smith County)
Victoria	Victoria MSA (County)
Wichita Falls	Wichita Falls MSA
Texas	Texas Metro Counties

*Primary Metropolitan Statistical Area

Appendix C

Method for Estimating Percentage of Households That Can Afford the Median Priced Home

An estimate of the percentage of households in the market area that can qualify to buy the median-priced home is included for each THAI value. This estimate is based on the distribution of household incomes in the area. An estimate of this distribution is reported annually in the *Survey of Buying Power*, the same source used for median household income in the THAI equation. The distribution is expressed as the percentage of all households having EBI within a specified range. The income brackets used in the Survey are $20,000–$34,999; $35,000–$49,500; and $50,000 and more (Prior to 1996, a $10,000–$19,999 bracket also was reported). This information is converted to a cumulative income distribution showing the percentage of households earning more than $20,000; $35,000 and $50,000, respectively. The income needed to qualify for the median-priced home is calculated and this cumulative distribution is used to indicate how many households earn at least that amount of EBI.

The following example provides more detail. Suppose, for the subject market area, EBI is distributed as:

EBI	Percentage of Households
$20,000–$34,999	20
35,000–49,999	22
50,000 or more	18

This can be converted into a cumulative distribution:

EBI	Percentage Earning at Least This Amount
$20,000	60
$35,000	40
$50,000	18

Now, suppose that buying a median-priced home, at prevailing mortgage interest rates, requires a monthly payment (P&I) of $720. The monthly payment, multiplied by 1.18 to estimate PITI and divided by 0.28, requires an income of at least $36,411 to qualify. This income figure can be converted into EBI terms by dividing it by the appropriate statewide and local factors (see Appendix A). In this case, a household EBI of $32,000 is needed to qualify. The problem then becomes estimating the percentage of households with EBI of at least $32,000. This is done by interpolating between known points on the cumulative income distribution. The problem is simplified by assuming the distribution is a straight line between the $20,000 and $35,000 points (actual data from census years shows this to be a good assumption). Because $32,000 is eight tenths of the distance between $20,000 and $35,000, the percentage should be .8 of the distance from 60 and 40 percent, or 44 percent.

As mentioned earlier, the EBI distributions are reported in the annual *Survey of Buying Power* and are intended to represent the same period as are the median EBI figures — that is, the end of the previous year. To get the distributions to match the mid-point of the current quarter, they must be updated. The method used for THAI purposes assumes that no fundamental change in the shape of the distribution occurs over the year. In other words, the distribution at the beginning of the year is simply shifted by the same amount as the median.

An example explains how this is done. First, the distribution reported in the *Survey of Buying Power* is converted to a cumulative distribution. The amount of shift in the median is calculated by dividing the new median EBI by the end-of-the year EBI figure and subtracting 1.0. For the example, suppose the median is found to have shifted upward by 10 percent (.10) by the midpoint in the current quarter. Also suppose the distribution in the example is the same one shown in the previous example above. The percentage of households in the $20,000–$34,999 bracket is multiplied by 10 percent, with the result that the bracket expands by 2 percent. This amount is added to the old cumulative distribution for those making $20,000 or more. The new distribution is 60 percent plus 2 percent, or 62 percent. In like fashion, the other brackets of the distribution are updated:

Bracket	Percentage	10 Percent	Old cumulative	New cumulative
$35,000–$49,999	22	2.2	40	42.2
50,000+	18	1.8	18	19.8

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