



September 25, 2009

The Center for Business and Economic Research (CBER) recently released a report examining the affordability of housing in Lexington, Kentucky. However, after talking to local stakeholders and government officials we have realized that we were not successful in conveying what we felt were the important findings from our research: that there is an ample supply of affordable housing for a majority of people living in Lexington; that housing in the area has not become less affordable in recent years; that people who work in key occupations, such as teachers and nurses, can afford housing in Lexington; but that the poorest people in the area can only afford housing with assistance from the Government. Of course, since we are the authors of the study, it is our fault if the main messages from the study were not being received by all of the readers of our study, and we need to make an effort to clarify our findings and conclusions. Therefore, we are releasing a slightly revised version of our study that we believe more clearly conveys the main results from our analysis.

We have modified our June 29, 2009 report in the following ways. First, we included additional information in the executive summary about our for-sale housing and rental housing data. The text of the report contains these details, but we wanted to make sure the readers of the executive summary also had this information. Second, we have revised the last paragraph of the executive summary, along with the conclusion of the report, to state that more research is needed to understand the supply and demand of affordable housing for households with very low incomes of less than \$15,000 a year (below 30 percent of the area median income). In the original draft, we concluded that there appears to be enough affordable housing in Fayette County. This conclusion was based on our interpretation of 2000 data on the availability of housing subsidies and the composition of very low-income household income. This interpretation involved a set of assumptions which are reasonable and defensible. However, we acknowledge that it would be preferable to have more information on the very-low income households before drawing definitive conclusions on the overall state of housing affordability in Fayette County. Third, we discovered a few incorrect calculations in our analysis. We have updated the text and the tables accordingly. It is our hope that his revised report better conveys the findings of our analysis.

Sincerely,



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Housing Affordability in Lexington, Kentucky

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Executive Summary

The rapid rise in housing prices that occurred between 1990 and 2006 led many communities, including Lexington, Kentucky, to become concerned about whether individuals who hold “typical” jobs—such as teachers and police officers—could continue to live in the communities where they worked. Unfortunately, given the lack of recent detailed studies examining the affordability of housing in Fayette County (which contains Lexington), it is hard to know whether concerns about affordable housing are justified.¹ In response to this lack of information, the Home Builders Association of Lexington and the Lexington-Bluegrass Association of Realtors (LBAR) requested that the Center for Business and Economic Research (CBER) at the University of Kentucky examine the issue of housing affordability in Fayette County. This report contains the results of our investigation.

In this report we examine the availability of affordable housing in Fayette County, over the 1998 to 2007 period. Throughout the report we adopt the most commonly accepted definition of affordable housing—whether or not housing costs exceed 30 percent of a household’s gross income. Households with housing costs exceeding 30 percent of income are considered cost burdened and have less income to spend on other items such as food, clothing and healthcare. Using this definition we examine whether there is a sufficient supply of housing for households with various levels of income.

To obtain a complete picture of the availability of affordable housing in Fayette County, we examine both housing for sale and rent. LBAR provided data on actual house prices for all

¹ Several recent reports talk about the need for affordable housing in Lexington but they provide little empirical analysis documenting the need for housing affordability. Recent examples include the following Lexington-Fayette Urban County Government documents: Infill and Redevelopment Steering Committee Recommendations (April 10, 2009), the Affordable Housing Trust Fund Commission Report (September 2008), and the Social Services Needs Assessment Report (April 2008).

homes sold through them between 1998 and 2008. Rental prices are not available for each apartment in Fayette County. Therefore, we assume that rent is equal to the Housing and Urban Development (HUD) measure of fair-market rents for Fayette County. Housing costs include the monthly payments for rent (which we assume include utilities) or for mortgage payments, insurance, and utilities. They do not include up-front costs such as security deposits or down payments.

We consider affordability for households with various levels of income, but our focus is on households with income equal to 80 percent of the area median income. We call these households moderate-income households, and we choose them because they have the maximum household income for several government housing programs. The median of the household income distribution is the income at which half the households have less income and half the households have more income, just as the median of the housing price distribution is the price at which half the houses sell for less and half the houses sell for more. In contrast, the 10th percentile is the price where 10 percent of the houses sell for less and 90 percent sell for more. We examine the percentage of for-sale housing that a household with 80 percent of the county median income can afford without spending more than 30 percent of household income on housing costs. We also examine affordability for very low-income households (households earning 30 percent of the area median income), low-income households (households earning 50 percent of the area median income) and typical households (households earning the area median income). The household income data do not contain any information on household size. Therefore, the affordability calculations are not adjusted for differences in household size.

Our main findings are:

- Moderate-income households (ones with 80 percent of area median income) can afford to purchase approximately 15 percent of the for-sale housing in Fayette County during the 1998 to 2007 period. In other words, these households would be able to purchase housing in Fayette County with 30 percent or less of their annual income. Moderate-income households can easily afford rental housing with three bedrooms or fewer.
- Very-low and low-income households would not be able to purchase housing in Fayette County without being considered cost burdened. However, the low incomes of these households mean they are eligible for support from Federal programs such as the U.S. Department of Housing and Urban Development's (HUD) Section 8 Housing Voucher program, which would raise their effective income sufficiently to allow them to afford housing in Fayette County.
- Low-income households (households earning 50 percent of area median income) can afford rental housing in Fayette County during the 1998 to 2007 period.
- Very low-income households (households earning 30 percent of area median income) can afford rental housing only with the help of government subsidies, but only 15 percent of households in Fayette County have income in this range. Over 25 percent of these very-low-income households are headed by students whose incomes are likely temporarily low while they attend school.
- Individuals in valuable public-service occupations – police officers, teachers, and nurses – can afford for-sale housing with their salaries as their only source of income. Police officers, the lowest paid of these occupations, can afford to purchase between 10 and 18 percent of for-sale housing. Nurses, on the other hand, can afford roughly half the houses

Further research is needed on the supply and demand of affordable rental and for-sale housing for households with very low incomes. Substantial assistance from local, state, and Federal government such as Food Stamps, the Earned Income Tax Credit and housing vouchers are available, yet some of these programs – particularly housing voucher programs – have sizable waiting lists. However, little is known about very low-income households in Fayette County, aside from the fact that many of these households are university students whose housing expenses are usually subsidized by family members. More information on very low-income households is needed in order to design efficient, well-targeted programs to help low-income families with their potential housing problems.

I. Introduction

The rapid rise in housing prices that occurred between 1990 and 2006 has led many communities to become concerned about the affordability of housing their community. In particular, communities are concerned about whether individuals who hold the “typical” jobs—such as teachers, police officers and nurses—can continue to live in the city where they work. In turn, these concerns have led policy makers to consider programs designed to increase the availability of affordable housing in an area.

These concerns about affordable housing have recently been heard in Fayette County, Kentucky, despite the fact that Fayette County did not experience the meteoric increase in housing prices seen in other communities such as Miami, Florida and Las Vegas, Nevada. Unfortunately, given the lack of recent studies analyzing the affordability of housing in Fayette County, it is hard to know whether concerns about affordability are justified, or what the correct remedies might be to address any problem.² In response to this lack of information, the Home Builders Association of Lexington and the Lexington-Bluegrass Association of Realtors requested the Center for Business and Economic Research (CBER) at the University of Kentucky to examine the issue of housing affordability in Fayette County, Kentucky. This report contains the results of our investigation.

In this report we examine the availability of affordable housing for sale and rent in Fayette County, Kentucky, between 1998 and 2007. The report is divided into five sections. The first section defines affordable housing and reviews alternative definitions of affordable

² Several recent reports talk about the need for affordable housing in Lexington but they provide little if analysis to demonstrate the need for housing affordability. Recent examples include the following Lexington-Fayette Urban County Government documents: Infill and Redevelopment Steering Committee Recommendations (April 10, 2009), the Affordable Housing Trust Fund Commission Report (September 2008), and the Social Services Needs Assessment Report (April 2008).

housing. The second section of the report describes housing prices in Fayette County by examining the cost of housing for both renters and owners. We examine housing prices and housing characteristics (such as square footage and number of bedrooms) for houses that are low-priced (10 or 25 percent of houses have lower prices) and houses that are typically priced (half sell for less and half sell for more) to obtain a complete picture of housing prices and characteristics. The third section examines median household income for Fayette County. The median household income is where half the households have more income and half the households have less income. The fourth section examines whether housing is affordable in Fayette County by comparing the total costs of renting or owning a house to the income of households in Fayette County. For example, we look at the percentage of for-sale housing that a household with 80 percent of area median income can afford to purchase (i.e. spend 30 percent or less of gross income on housing costs). No adjustments are made for household size due to data limitations. The final section concludes.

II. Affordable Housing Definitions

According to the U.S. Department of Housing and Urban Development (HUD), the commonly accepted definition of affordable housing is housing costs that do not exceed 30 percent of a household's gross income. Housing costs include taxes, insurance (for homeowners), and utility costs. Housing is considered unaffordable when monthly housing costs exceed 30 percent of household income. More specifically, households are considered cost burdened when more than 30 percent of income is spent on housing. Other definitions of affordable housing are extensions of this definition that specifically look at whether individuals in the lower parts of the income distribution spend more than 30 percent of their income on

housings. For example, eligibility for many federal, state, and housing programs are limited to households that have an income less than or equal to 80 percent of area median income (AMI). Affordable Housing Online defines affordable housing as “housing that is affordable for individuals earning less than 80 percent of area median income.” Individuals are considered eligible for Section 8 or the Housing Choice Voucher Program if they have incomes below 50 percent of the area median income, in which case individuals can receive vouchers that cover housing costs exceeding 30 percent of their adjusted monthly income up to a set limit. For the purposes of this report we define affordable housing as housing costs not exceeding 30 percent of household income. Our primary level of income for measuring housing affordability is 80 percent AMI due to its use as an income threshold in many government housing programs.

III. Housing Prices in Fayette County Kentucky

We present data on housing prices and housing characteristics (such as location, size and age) for every house sold in Fayette County from 1998 up until 2008. The housing data were provided to us by the Lexington-Bluegrass Association of Realtors. All housing prices are converted into 2007 dollars using the Consumer Price Index for all urban consumers (CPI-U).

Figure 1 and Table 1 show the changes in housing prices between 1998 and 2008 for houses at various points of the distribution of housing prices. Houses at the 10th percentile of the housing price distribution are houses with very low prices: 10 percent of houses sold for less and 90 percent sold for more. Houses with prices at the 90th percentile of the housing price distribution are some of the most expensive houses in an area: 90 percent of houses sold for less and 10 percent sold for more. Houses at the 50th percentile of the housing price distribution are

considered the typical houses in an area because half the houses sold for less and half the houses sold for more.

In Figure 1 and Table 1 we can see that prices of houses in the 10th percentile of the housing price distribution grew at the slowest rate of any point in the housing price distribution. Between 1998 and 2001 the price of houses at the 10th percentile of the housing price distribution increased from \$88,407 to \$92,490 or by almost five percent. From 2002 to 2006 the price of a house at the 10th percentile grew very modestly to \$96,677 (an increase of roughly two percent) but by 2008 housing prices had decreased to \$86,191 (a drop of 11 percent). In other words, the price of some of the least expensive houses in Fayette County fell between 1998 and 2008. Between 1998 through 2001 housing prices at the 25th percentile increased from \$107,869 to \$113,397 or by five percent, a rate comparable to growth in prices at the 10th percentile of the housing price distribution. From 2002 through 2006, however, housing prices at the 25th percentile increased more rapidly than prices at the 10th percentile. Prices at the 25th percentile increased to \$125,989 over this period (an increase of seven percent). After 2006 housing prices at the 25th percentile fell by six percent to \$117,971 in 2008. Thus, housing prices at the 25th percentile fell at a slightly slower rate after 2006 than housing prices at the 10th percentile.

Figure 1 and Table 1 illustrate that median housing prices grew at almost the same rate as housing prices in the 25th percentile of the housing price distribution over the 1998 to 2008 period. Between 1998 through 2001 median housing prices increased from \$140,198 to \$144,589 or by three percent. From 2002 to 2006 median housing prices increased more rapidly from \$149,830 to \$161,935 or by eight percent. By 2008 median housing prices had fallen to \$151,869 or by six percent, a rate similar to the drop in housing prices at the 25th percentile and

less than the drop in housing prices at the 10th percentile. Housing prices near the top of the housing price distribution exhibited the fastest increases in prices. Prices of houses at the 90th percentile of the housing price distribution increased from \$274,633 to \$288,008 over the 1998 to 2001 period (an increase of five percent) and from \$288,008 to \$326,134 over the 2001 to 2006 period (an increase of 13 percent). By 2008 prices fell to \$308,168 (a decline of six percent).

In summary Figure 1 and Table 1 show that the prices of houses at lower parts of the housing price distribution (i.e. inexpensive homes) exhibited the slowest rates of growth. From 1998 to 2001 housing prices at various points of the housing price distribution grew at comparable rates. However, over the four-year period between 2002 and 2006 housing prices at the 10th percentile of the distribution were essentially unchanged while prices at the 25th and 50th percentiles were increasing by roughly seven to eight percent. Finally, from 2006 to 2008 housing prices at the 10th percentile had fallen by 11 percent, whereas prices at the 25th and 50th percentiles had fallen by six percent. Over the 1998 to 2008 period the price of less-expensive houses (10th percentile) had declined by three percent, the price of the typical house (50th percentile) had increased by eight percent and the price for more-expensive houses (90th percentile) had increased by 12 percent.

Although the prices of less-expensive houses may not have changed very much in the past decade, it is possible that the quality of these houses has changed. To examine this possibility, in Table 2, we look at the characteristics of houses at various parts of the housing price distribution. When we do this we find that in Fayette County between 1998 -2008, the distribution of housing characteristics remained essentially unchanged. The median house had roughly 1,700 square feet, three bedrooms, and two bathrooms during the 1998-2008 period.

Houses near the bottom of the housing characteristic distributions, i.e. at the 10th percentile, had approximately 1,000 square feet, two bedrooms and one bathroom, whereas houses near the top of the housing characteristic distributions, i.e. at the 90th percentile, had 3,000 square feet, four bedrooms and three bathrooms. In other words, in 2008 the quality of less-expensive houses in the county is similar to the quality of less-expensive houses in 1998.

In addition to housing prices, we present statistics on the distribution of rental prices for Fayette County over the 1998-2008 period (Table 3). Rental prices are obtained from the U.S. Housing and Urban Development (HUD) database on fair market rents by county. Fair market rents are rents effective October 1 of each year and are specified in order to ensure an adequate supply of rental housing for individuals participating in many of HUD's housing programs (such as Section 8). HUD estimates fair market rents for 530 metropolitan areas and 2,045 nonmetropolitan county areas. Fair market rents are gross rent estimates that include rent associated with shelter plus the cost of all tenant-paid utilities (except telephones, cable or satellite television service, and internet service). Fair market rents are converted into 2007 prices using the Consumer Price Index for all urban consumers (CPI-U).

Figure 2 illustrates that monthly fair market rents for efficiencies, one-bedroom, two-bedroom and three-bedroom apartments changed very little over the 1998 to 2008 period. Between 1998 and 2004 monthly rents for efficiencies, one-bedroom, two-bedroom and three-bedroom apartments declined approximately five percent. Between 2004 and 2008 monthly rents for one-bedroom, two-bedroom and three-bedroom apartments increased by five to six percent, whereas monthly rents for efficiencies had increased by nine percent. Over the entire 1998 to 2008 period, monthly rents for efficiencies increased by four percent. In contrast, monthly rents for one-bedroom, two-bedroom and three-bedroom apartments were essentially

unchanged. Efficiencies cost between \$410 and \$444 over the 1998 to 2008 period, one-bedroom apartments cost between \$506 and \$534 , two-bedroom apartments cost between \$620 and \$658, and three-bedroom apartments between \$832 and \$887. The bottom line from Figure 2 is that, in 2008, the rent for an apartment in Fayette County is approximately the same in inflation adjusted dollars as the rent for the same apartment in 1998.

To summarize, we find that the prices of the median and lower prices homes have changed very little between 1998 and 2008, and may have actually declined over this period. In addition, we find no evidence that there has been any decline in the quality of these houses over this period. Finally, we find that the rental price for apartments in Fayette County remained essentially constant between 1998 and 2008.

IV. Income of Fayette County Workers and Households

Next we turn to examining how incomes have changed for Fayette County workers and households over the recent period. Household Income data are obtained from the Census Bureau's Small Area Income and Poverty Estimates (SAIPE). The SAIPE program contains annual estimates of county income and poverty statistics. The SAIPE program is intended to provide estimates of income and poverty to facilitate the administration of federal programs. Importantly the SAIPE measures annually median household income in Fayette County. The SAIPE does not contain any information on household size; therefore, the household income data are not adjusted for differences in household size.

Table 4 displays median household income from 1998 through 2007 (the last year that income data are available from the SAIPE). All income data are converted to 2007 dollars using the Consumer Price Index for all urban consumers (CPI-U). As a reminder, half the households

in Fayette County have household incomes below the median income, and half the households in Fayette County have household incomes above the median income. The median household in Fayette County saw their income fall by almost \$5,000 over the 1998 to 2007 period. Median household income was \$51,413 in 1998 and dropped dramatically to \$46,020 by 2002. After 2003 median household income fell more modestly to \$45,416 in 2005 before rising slightly to \$46,726 in 2007.

We also study the incomes of specific occupations in Fayette County. Table 5 presents the median yearly earnings for four occupations: police officers, elementary school teachers, secondary school teachers, and nurses. We choose these occupations because they represent occupations that provide essential services to the community in terms of protecting, educating, and providing health care services for county residents.³ Data from 1999 to 2007 are available from the U.S. Bureau of Labor Statistics, Occupational Employment Statistics. Data are not available for all occupations in all years; missing data are labeled “n/a” in the tables. The statistics are based on a small sample of respondents in each occupation, so the figures reported in the tables should be interpreted as estimates of the true earnings in each occupation.

Of the four occupations listed, police officers are the lowest-paid occupation throughout the period, with annual median earnings of \$36,410 in 2007. Nurses are the highest-paid occupation throughout the period, with annual median earnings of \$55,440 in 2007. Elementary and secondary school teachers have annual median earnings between \$42,000 and \$49,000. For example, the median earnings for an elementary school teacher are \$42,450 in 2007, and the median earnings for a secondary school teacher are \$44,770 in 2007.

³ We do not include fire fighters because we do not have a reasonable estimate of their total earnings. Most fire fighters are part-time employees, and we have no way to estimate other possible sources of income.

V. Affordable Housing in Fayette County

In this section of the report we examine whether housing in Fayette County is affordable for households with various income levels. Specifically, we calculate the percentage of houses that households with annual income of 30, 50, 80, and 100 percent of the area median income can afford to purchase with 30 percent or less of their monthly income. We also consider the affordability of rental housing. Households with incomes at 30 percent of the area median are often defined as having very low income, households with incomes at 50 percent of the area median are often defined as low income, households with incomes at 80 percent of the area median are often defined as moderate income, and households with 100 percent of the area median income are often defined as typical income.

Total housing costs are computed as the sum of monthly mortgages payments, taxes paid on properties, and monthly costs for insurance and utilities. The appendix provides more information on the calculation of each of these costs. Total costs are calculated for 1998 through 2007 because utility costs are not available for 2008. As always, all dollar figures are for 2007 dollars. Total monthly housing costs for homeowners in Fayette County are displayed in Table 6. Homeowners with house prices in the 10th percentile of the housing price distribution (10 percent of houses sold for less; 90 percent sold for more) had total monthly housing costs between \$835 and \$937 over the 1998 to 2007 sample period. Homeowners with house prices in the 25th percentile of the housing price distribution (25 percent sold for less; 75 percent sold for more) had total housing costs between \$993 and \$1,120 over the same period. The median house price (half the houses sold for less; half the houses sold for more) had between \$1,239 and \$1,382 a month in total housing costs over the 1998 to 2007 sample period. Homeowners with house prices in the 75th percentile of the housing price distribution (75 percent sold for less; 25

percent sold for more) paid between \$1,663 and \$1,885 in total monthly housing costs. Finally homeowners with house prices in the 90th percentile of the housing price distribution (90 percent sold for less; 10 percent sold for more) paid between \$2,263 and \$2,609 in total monthly housing costs. On average homeowners in the 10th percentile of the housing price distribution paid around \$1,500 less in total monthly housing costs than owners in the 90th percentile, around \$900 less than owners in the 75th percentile, \$400 less than owners in the 50th percentile and \$200 less than owners in the 25th percentile.

A. Affordability of For-Sale Housing

To determine the level of affordable housing in Fayette County, monthly incomes for the median household and households with incomes at 30, 50 and 80 percent of the median are compared to total monthly housing costs for houses with different selling prices. Table 7 illustrates the fraction of for-sale housing that households of various income levels can afford if they spent 30 percent or less of their gross income on housing costs. According to HUD the most common definition of affordable housing is housing costs not exceeding 30 percent of a household's income. Households with costs exceeding 30 percent of income are considered cost burdened.

Moderate-income households, those with 80 percent of the area median income, can afford between 10 and 18 percent of for-sale housing in Fayette County between 1999 and 2007. A non-trivial number of houses are affordable, but the majority of for-sale housing is not affordable for moderate-income households if they want to spend 30 percent or less of their income on housing. For the typical household (with median household income), the percentage of affordable housing is noticeably higher: between 28 and 44 percent. Affordable housing is widely available for by the typical household. Due to a combination of relatively high income,

relative low house prices, and relatively low interest rates, affordability for moderate-income and typical households is much higher in 1998 than in later years (1999 through 2007).

Table 7 also displays the percentage of affordable housing for households with incomes that are equal to 30 and 50 percent of area median incomes in Fayette County during the 1998 to 2007 period. Households with incomes 30 percent of median household income in Fayette County can afford to purchase less than one percent of for-sale housing in the County. In order to purchase nearly all for-sale housing, such households would need to spend more than 30 percent of their household income.

It is worth noting that households with incomes equal to 30 percent of the median household income are extremely low-income households; 30 percent of median household income is around \$14,000 a year for 2007 (Table 4). Approximately 15 percent of households in Fayette County have household income under \$15,000 a year, and more than one-fourth of these very-low-income households are headed by students (authors' calculations from U.S. Census Bureau data). Because students often receive financial assistance from their parents while they are in school and usually receive an increase in income when they finish school and enter the labor market, they are not usually the focus of affordable housing policies. Households with 30 percent of the area median income earn about \$5,000 more than one individual receiving the minimum wage in Kentucky and about \$5,000 less than two individuals in a household both receiving the minimum wage in Kentucky.⁴ Households with annual income at 30 percent of area median income have incomes only \$1,700 higher than the annual income received by a two-person family defined as poor under 2007 federal poverty guidelines (\$13,690) and roughly

⁴ The minimum wage in Kentucky is currently \$6.55 per hour and the numbers above assume individuals work full time (more than 30 hours per week) for the full year (50 weeks in a year).

\$3,000 less than the annual income received by a three-person family defined as being poor under the same guidelines (\$17,170).

Table 7 illustrates that households with incomes at or below 50 percent of area median income would not be able to purchase housing in Fayette County over the 1998 to 2007 period without being considered cost burdened. However, these households would have incomes that are low enough to be eligible to receive Federal housing subsidies. Households with 50 percent of area median income have annual incomes that were around \$23,000 a year, \$3,000 higher than the annual income of two individuals in a household receiving the Kentucky minimum wage.

In addition to studying housing affordability for households of different incomes, we also study housing affordability for specific occupations in Fayette County. Table 8 contains the percentage of for-sale housing that is affordable for the typical worker (i.e. the worker with median earnings) in four occupations discussed earlier: elementary school teachers, secondary school teachers, police officers, and nurses. As stated previously, we assume that household income is equal to individual earnings for each occupation. In other words, we assume that there is no other source of income such as additional jobs, savings, etc. in these households.

Table 8 shows that police and safety workers in the County can afford between 10 and 18 percent of for-sale housing.⁵ Most houses are not affordable if police officers spend 30 percent or less of their annual earnings. In contrast, elementary school teachers can afford between 23 and 37 percent of for-sale housing in Fayette County, and secondary school teachers can afford between 28 and 37 percent. Thus, school teachers in Fayette County can afford to purchase a variety of homes in the County using only their annual earnings. Nurses can afford the highest

⁵ For all occupations, houses are among the least affordable in 2000 due to mortgage interest rates in excess of eight percent.

percentage of houses in the County: between 32 and 53 percent. In several years, nurses can afford more than 50 percent of the for-sale housing in the County.

B. Affordability of Rental Housing

To provide a complete picture of the availability of affordable housing in Fayette County we also examine the cost of rental housing in the county. We do not have information on rental prices for specific apartments; instead, we have HUD fair market rents (discussed earlier).⁶ Therefore, we calculate the percentage of income that households of different income levels would have to spend to afford apartments priced at the HUD fair market rents.

Table 9 displays the fraction of monthly income spent on rental housing by a household with 80 percent of the area median household income, what we call moderate-income households. Efficiencies would cost moderate-income households 12 to 14 percent of their monthly income over the 1998 to 2007 period, whereas one-bedroom rentals would cost 16 to 17 percent of the monthly income over the same period. Two- and three-bedroom rentals would respectively cost 19 to 21 percent and 26 to 28 percent of the moderate-income household's monthly income. Overall the results suggest that moderate-income households can easily afford rental housing in Fayette County over the 1998 to 2007 period without being considered cost burdened. Because moderate-income households can afford rental housing, and median household income is higher than moderate household income, median income households can also afford rental housing without being considered cost burdened.

⁶ We acknowledge that the quality of the rental data is much lower than the quality of the for-sale housing data used in this study. The for-sale housing data contain the price and attributes of every house sold through LBAR. A similar database of rental units, or even a random subset of apartments, would allow us to conduct a similar, detailed analysis of the Lexington rental market. However, data on rental apartments and prices are simply not available, so we are forced to use data from HUD on fair-market rents, which only contain one fair-market rent for all efficiency apartments in Lexington in a given year, one fair-market rent for one-bedroom apartments in Lexington in a given year, etc.

Table 10 illustrates the fraction of monthly income spent on rental housing by households with income at 30 percent of area median income (very low-income households) and households with income at 50 percent of area median income (low-income households). Households earning 30 percent of area median income would have to spend between 33 and 38 percent of their monthly income to rent efficiencies in Fayette County during the 1998 to 2007 period and between 41 and 45 percent of their monthly income to rent one-bedroom apartments. Households earning 50 percent of area median income would have to pay between 20 and 23 percent of the monthly income to rent efficiencies, between 25 and 27 percent of their income to rent one-bedroom apartments, between 30 and 34 percent of their income to rent two-bedroom apartments and between 41 and 45 percent of their income to rent three-bedroom apartments.

Households earning 30 percent of area median income are eligible for various government subsidies such as Section 8 housing vouchers which require households to have incomes at 50 or less than the area median. These households are also eligible to receive the Federal Earned Income Tax Credit, and some may already receive it. The effect of both of these programs is to raise the effective incomes of these low-income households so that they could afford to consume rental housing that was previously unaffordable.

Finally, in Table 11, we present the fraction of monthly income spent on rental housing for police officers, the occupational group with the least affordability of for-sale housing among the four occupations listed in Table 8. In Table 11, we see that police officers can afford rental housing consisting of three bedrooms, spending at most 29.7 percent of their gross monthly income. Because other public safety occupations have higher salaries than police officers, we conclude that rental housing is affordable for crucial public-safety occupations.

C. Summary of Affordability

Examination of the availability of affordable housing for purchase in Fayette County over the 1998 to 2007 period suggests that households with income at 80 percent of area median income (moderate income) could afford up to 18 percent of all housing in Fayette County and households with median income can afford up to 44 percent of all the housing in Fayette County without being considered cost burdened. Households with incomes at or below 30 percent of area median income (very low income) and households with incomes at or below 50 percent of area median income (low income) would not be able to purchase housing in Fayette County without being considered cost burdened. However, these households may be able to purchase affordable housing with government assistance.

With respect to rental housing, households with at least 80 percent of area median income can afford rental housing without being cost burdened. Households at 30 percent of area median income can almost afford renting efficiencies without being cost burdened, and households with income at 50 percent of area median income can afford efficiencies and one-bedroom apartments without being considered cost burdened. Because households at or below 30 percent of area median income are eligible to receive Section 8 vouchers, these households likely would be able to afford efficiencies and one-bedroom apartments – with federal government assistance – without being considered cost burdened.

VI. Conclusion

In conclusion, based on the commonly accepted definition of affordable housing as housing costs not exceeding more than 30 percent of a household's income, approximately 15 percent of for-sale housing in Fayette County is affordable for moderate-income households

(households with income at 80 percent of area median income) during the 1998 to 2007 period. However, moderate-income households would have to spend more than 30 percent of household income to purchase approximately 85 percent of for-sale housing in the County. Households with the median household income can afford around 40 percent of for-sale housing. Affordable properties for sale exist for low-income households (50 percent of median household income) once we factor in the support these households would receive from the Federal Government. Affordable housing for rent exists for low-income households (households earning 50 percent of area median income). Affordable housing for rent exists for very low-income households (households earning 30 percent of area median income) with the help of government subsidies, but these households have very little income –below the poverty line for a family of three—and so would qualify for various forms of assistance from the local, state, and Federal government. However, more work is needed to determine if this assistance is sufficient to meet the demand for affordable housing in Fayette County.

Figure 1. Selling Price of Housing (Fayette County, KY)
Source: Lexington-Bluegrass Association of Realtors

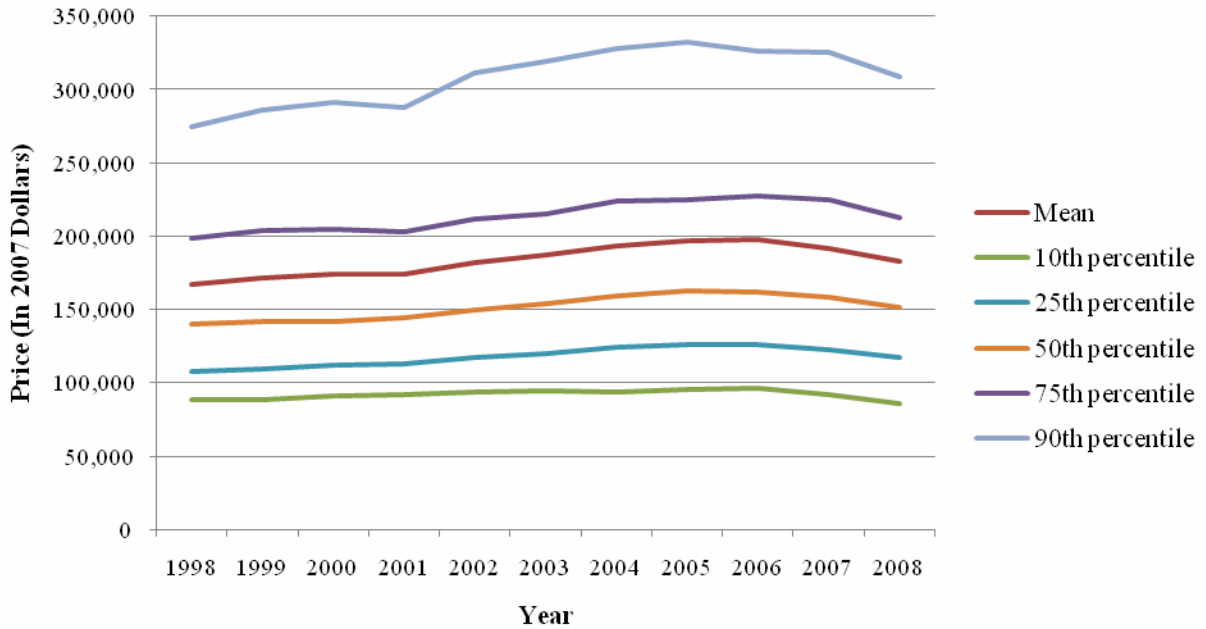


Figure 2. Fair Market Rents (Fayette County, KY)
Source: U.S. Department of Housing and Urban Development (HUD)

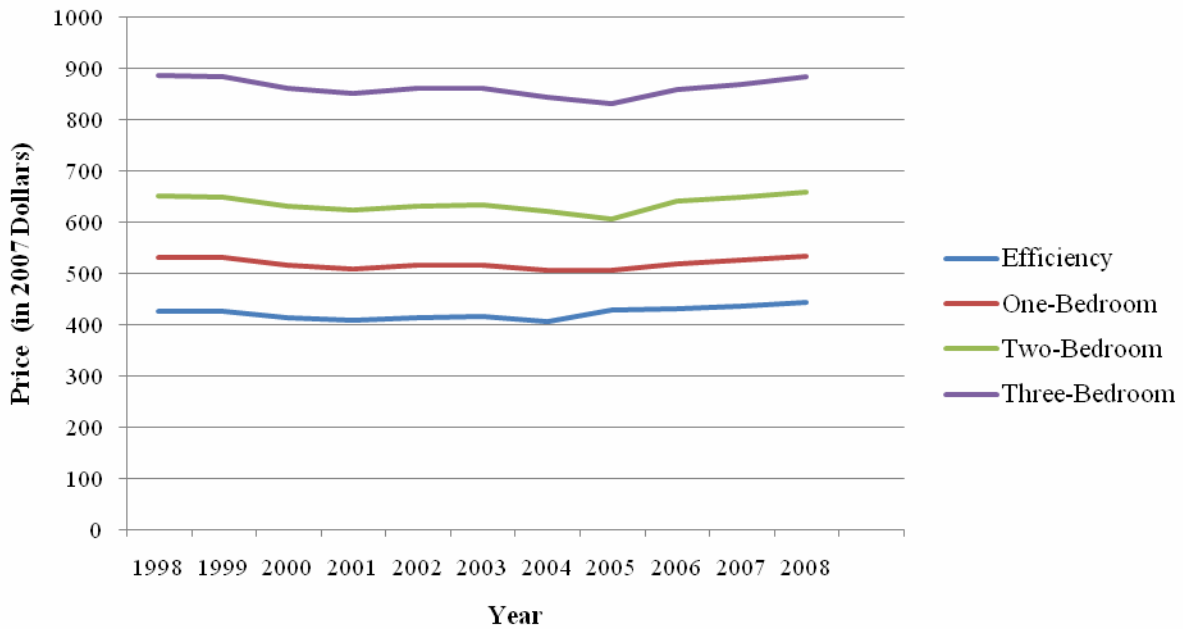


Table 1: Distribution of Selling Price

Year	Mean	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
1998	\$167,434	\$88,407	\$107,869	\$140,198	\$198,438	\$274,633
1999	\$171,863	\$88,674	\$109,396	\$141,816	\$203,991	\$286,122
2000	\$174,018	\$91,269	\$111,979	\$142,081	\$204,693	\$291,387
2001	\$174,175	\$92,490	\$113,397	\$144,589	\$203,163	\$288,008
2002	\$182,272	\$94,393	\$117,444	\$149,830	\$211,952	\$311,186
2003	\$187,694	\$94,660	\$120,574	\$153,816	\$215,230	\$319,036
2004	\$193,345	\$94,396	\$124,219	\$159,156	\$223,916	\$327,752
2005	\$197,170	\$95,549	\$126,337	\$162,965	\$225,072	\$331,768
2006	\$197,920	\$96,677	\$125,989	\$161,935	\$227,295	\$326,134
2007	\$192,227	\$92,000	\$122,500	\$158,588	\$225,000	\$325,000
2008	\$183,131	\$86,191	\$117,971	\$151,869	\$212,514	\$308,168

Source: Lexington-Bluegrass Association of Realtors

Table 2: Distribution of Housing Characteristics for Fayette County, KY

	Housing Price Distribution Percentile					
	Mean	10th	25th	50th	75th	90th
Selling Price	\$184,578	\$92,223	\$117,180	\$151,760	\$213,733	\$308,191
Square Feet	1,915	1,075	1,300	1,701	2,320	2,960
# Bedrooms	3.21	2	3	3	4	4
# Bathrooms	2.45	1	2	2	3	3

Source: Lexington-Bluegrass Association of Realtors

Table 3: Distribution of Fair Market Rents for Fayette County, KY

Year	Efficiency	One-Bedroom	Two-Bedroom	Three-Bedroom
1998	\$426	\$532	\$650	\$887
1999	\$426	\$530	\$648	\$885
2000	\$414	\$515	\$631	\$861
2001	\$410	\$509	\$624	\$851
2002	\$415	\$516	\$632	\$862
2003	\$416	\$517	\$634	\$863
2004	\$406	\$506	\$620	\$844
2005	\$429	\$506	\$606	\$832
2006	\$432	\$518	\$640	\$860
2007	\$437	\$525	\$647	\$870
2008	\$444	\$534	\$658	\$884

Source: U.S. Department of Housing and Urban Development (HUD) Fair Market Rents

Table 4: Median Annual Household Income for Fayette County, KY

Year	Percentage of Area Median Income (AMI)			
	30 percent	50 percent	80 percent	100 percent
1998	\$15,424	\$25,707	\$41,131	\$51,413
1999	\$14,706	\$24,510	\$39,216	\$49,020
2000	\$14,700	\$24,501	\$39,201	\$49,001
2001	\$14,189	\$23,648	\$37,836	\$47,295
2002	\$13,806	\$23,010	\$36,816	\$46,020
2003	\$13,825	\$23,042	\$36,867	\$46,084
2004	\$13,699	\$22,832	\$36,531	\$45,664
2005	\$13,625	\$22,708	\$36,333	\$45,416
2006	\$13,694	\$22,823	\$36,517	\$45,646
2007	\$14,018	\$23,363	\$37,381	\$46,726

Source: U.S. Census Bureau Small Area Income & Poverty Estimates

Table 5: Median Annual Earnings for Selected Occupations, Fayette County, KY

Year	Occupation			
	Police Officers	Elementary School Teachers	Secondary School Teachers	Nurses
1999	\$36,478	\$45,700	\$45,824	\$47,567
2000	\$37,567	\$45,899	\$48,019	\$47,248
2001	\$37,453	n/a	\$47,755	\$49,172
2002	\$38,495	\$44,546	\$47,773	\$49,329
2003	\$35,620	\$43,688	\$47,294	\$49,717
2004	\$34,905	\$43,411	\$45,903	\$52,467
2005	\$34,716	\$42,445	\$44,643	\$52,945
2006	\$35,894	n/a	n/a	\$51,887
2007	\$36,410	\$42,450	\$44,770	\$55,440

Source: U.S. Bureau of Labor Statistics (BLS), Occupational Employment Statistics.

Table 6: Distribution of Total Monthly Housing Costs

Year	Housing Price Distribution Percentile				
	10th	25th	50th	75th	90th
1998	\$845	\$993	\$1,239	\$1,683	\$2,263
1999	\$875	\$1,040	\$1,297	\$1,791	\$2,444
2000	\$937	\$1,110	\$1,362	\$1,885	\$2,609
2001	\$898	\$1,057	\$1,294	\$1,740	\$2,385
2002	\$864	\$1,032	\$1,269	\$1,724	\$2,450
2003	\$835	\$1,013	\$1,242	\$1,663	\$2,376
2004	\$844	\$1,050	\$1,290	\$1,736	\$2,450
2005	\$871	\$1,085	\$1,340	\$1,772	\$2,514
2006	\$906	\$1,120	\$1,382	\$1,860	\$2,581
2007	\$864	\$1,087	\$1,350	\$1,835	\$2,564

Source: Authors' calculations from LBAR data

Table 7: Percentage of For-Sale Housing that Is Affordable, by Percentage of Area Median Income

	Percentage of Area Median Income (AMI)			
Year	30 percent	50 percent	80 percent	100 percent
1998	0.5%	2.4%	30.0%	54.0%
1999	0.4%	2.1%	18.1%	43.9%
2000	0.5%	2.1%	13.1%	36.6%
2001	0.2%	1.8%	13.2%	39.1%
2002	0.4%	1.9%	14.1%	38.7%
2003	0.5%	2.4%	17.3%	40.5%
2004	0.2%	2.2%	15.1%	37.4%
2005	0.5%	2.5%	12.8%	30.0%
2006	0.5%	1.9%	10.3%	27.6%
2007	0.7%	2.3%	13.1%	33.6%

Source: Authors' calculations from LBAR data and U.S. Census data

Table 8: Percentage of For-Sale Housing that Is Affordable, by Occupation

Year	Occupation			
	Police Officers	Elementary Teacher	Secondary Teacher	Nurse
1999	12.3%	37.1%	37.5%	40.8%
2000	10.3%	28.2%	33.7%	32.3%
2001	12.4%	n/a	40.3%	44.4%
2002	18.0%	34.9%	43.4%	46.4%
2003	14.6%	34.2%	44.2%	50.1%
2004	11.5%	29.8%	38.0%	51.9%
2005	9.6%	23.0%	28.1%	48.9%
2006	9.5%	n/a	n/a	43.0%
2007	12.1%	22.8%	28.3%	53.1%

Source: Authors' calculations from LBAR data and BLS data

Table 9: Percentage of Income Spent on Rental Housing by Households with 80 Percent AMI

Year	Efficiency	One-Bedroom	Two-Bedroom	Three-Bedroom
1998	12.4%	15.5%	19.0%	25.9%
1999	13.0%	16.2%	19.8%	27.1%
2000	12.7%	15.8%	19.3%	26.4%
2001	13.0%	16.1%	19.8%	27.0%
2002	13.5%	16.8%	20.6%	28.1%
2003	13.5%	16.8%	20.6%	28.1%
2004	13.3%	16.6%	20.4%	27.7%
2005	14.2%	16.7%	20.0%	27.5%
2006	14.2%	17.0%	21.0%	28.3%
2007	14.0%	16.9%	20.8%	27.9%

Note: AMI is an abbreviation for Area Median Income.

Source: Authors' calculations from HUD data and U.S. Census data

Table 10: Percentage of Income Spent on Rental Housing by Households with 30 and 50 Percent AMI

Year	30 Percent of AMI		50 Percent of AMI			
	Efficiency	One-Bedroom	Efficiency	One-Bedroom	Two-Bedroom	Three-Bedroom
1998	33.1%	41.4%	19.9%	24.8%	30.3%	41.4%
1999	34.8%	43.2%	20.9%	25.9%	31.7%	43.3%
2000	33.8%	42.0%	20.3%	25.2%	30.9%	42.2%
2001	34.7%	43.0%	20.8%	25.8%	31.7%	43.2%
2002	36.1%	44.9%	21.6%	26.9%	33.0%	45.0%
2003	36.1%	44.9%	21.7%	26.9%	33.0%	44.9%
2004	35.6%	44.3%	21.3%	26.6%	32.6%	44.4%
2005	37.8%	44.6%	22.7%	26.7%	32.0%	44.0%
2006	37.9%	45.4%	22.7%	27.2%	33.7%	45.2%
2007	37.4%	44.9%	22.4%	27.0%	33.2%	44.7%

Note: AMI is an abbreviation for Area Median Income.

Source: Authors' calculations from HUD data and U.S. Census data

Table 11: Percentage of Income Spent on Rental Housing by Police Officers

Year	Efficiency	One-Bedroom	Two-Bedroom	Three-Bedroom
1998	14.0%	17.5%	21.4%	29.2%
1999	13.6%	16.9%	20.7%	28.3%
2000	13.3%	16.5%	20.2%	27.6%
2001	12.8%	15.9%	19.5%	26.5%
2002	14.0%	17.4%	21.3%	29.0%
2003	14.3%	17.8%	21.8%	29.7%
2004	14.0%	17.5%	21.4%	29.2%
2005	14.3%	16.9%	20.3%	27.8%
2006	14.2%	17.1%	21.1%	28.3%
2007	14.0%	17.5%	21.4%	29.2%

Source: Authors' calculations from HUD data and BLS data

Appendix: Calculation of Total Monthly Housing Costs

Total housing costs included monthly mortgage payments, taxes paid on the property, homeowners' insurance costs and utility costs. Taxes paid on the property and homeowners' insurance are measured annually whereas mortgage payments and utility costs are computed monthly. The annual measures are divided by twelve and added to the monthly measures to produce an estimate of total monthly housing costs. Monthly mortgage rates are determined by the selling price of the property and 30-year fixed mortgage rates from Freddie Mac's primary mortgage market survey. Interest on 30-year mortgages were seven percent in 1998, peaked at eight percent in 2000 and then remained constant at six percent beginning in 2003.

Appendix Table 1 contains monthly mortgage payments for the 10th, 25th, 50th, 75th, and 90th percentiles of the housing price distribution. Monthly mortgage payments for houses in the 10th percentile of the housing price distribution were roughly \$585 in 1998 and peaked at roughly \$673 in 2000. After peaking in 2000 payments fell steadily to roughly \$556 in 2004, and then briefly spiked to \$605 in 2006 before declining to \$518 in 2008. There was a roughly \$66 decline in monthly mortgage payments for houses in the 10th percentile of the housing price distribution. Mortgage payments for houses in the 25th percentile of the housing price distribution were \$713 in 1998, peaked to \$826 in 2000 and fell back to \$710 in 2003. From 2003 onward payments increased to \$789 in 2006 and declined to roughly \$710 in 2008. Mortgage payments for houses in the 25th percentile of the housing price distribution were essentially unchanged over the 1998 to 2008 period.

Median mortgage payments changed moderately over the 1998 to 2008 period. Monthly payments were roughly \$927 in 1998 and increased to a high of \$1,047 in 2000. Starting in 2001 monthly payments declined to \$905 in 2003 before increasing again to \$1,014 in 2006. By 2008

prices had declined to \$913. Monthly mortgage payments had declined by \$14 over the 1998 to 2008 period.

Monthly payments for houses in the 75th percentile of the housing price distribution were roughly \$1,312 in 1998, increased to roughly \$1,509 in 2000 and then declined to \$1,267 in 2003. Monthly payments began to increase moderately to \$1,423 in 2006 before declining to roughly \$1,278 in 2008. Over the 1998 to 2008 period, monthly payments for houses in the 75th percentile of the housing distribution had declined by \$34.

For houses in the 90th percentile of the housing price distribution, monthly payments were roughly \$1,816 in 1998, increased to a high of \$2,148 in 2000 and then fell to \$1,878 in 2003. Monthly mortgage payments began increasing in 2004 and were roughly \$2,042 in 2006 before again falling to \$1,854 in 2008.

Overall monthly mortgage payments for houses in the 10th percentile of the housing price distribution were on average \$1,370 less than monthly payments for houses in 90th percentile and \$772, \$375 and \$162 higher than payments for houses in the 75th, 50th and 25th percentiles, respectively.

Information on taxes paid for houses in Fayette County was obtained from the Fayette County Property Valuation Administrator. The amount of taxes owed on the property is determined by the selling price of the property and tax rates that are a combination of state and local taxes in addition to taxes levied by the local school district. The distribution of monthly taxes paid on houses at different points in the housing price distribution is illustrated in the right half of Appendix Table 1. The jump in taxes between 2004 and 2005 is due to the implementation of a 0.6 percentage point tax for Lex Tran. Owners of houses in the 10th percentile of the housing price distribution paid between \$70 and \$81 in monthly property tax

over the 1998 to 2008 period. Owners of houses in the 25th percentile of the housing price distribution paid between \$86 and \$107 in monthly property taxes over the 1998 to 2008 period while median owners paid between \$110 and \$139 over the same period. Owners in the 75th percentile paid between \$155 and \$197 over the 1998 to 2008 period. Finally, owners in the 90th percentile of the housing price distribution paid between \$219 and \$284 in annual property taxes over the sample period. In 2008, overall taxes paid on homes in the 10th percentile of the housing price distribution were \$196 less than taxes paid on houses in the 90th percentile and \$111, \$58, and \$28 less than houses in the 75th, 50th, and 25th percentiles, respectively.

Data on insurance costs for Fayette County were obtained from a large provider of homeowners' insurance. Due to data limitations monthly housing insurance costs are not available for every year. The data limitations force us to use insurance costs for 2009, a year outside the sample period. We assume that the insurance costs have remained constant (in terms of 2007 dollars) over the 1998 to 2008 period. The difference in estimated insurance costs is computed solely as a function of the selling price of the house; all other characteristics such as the location and the type of construction are the same for each part of the housing distribution. In other words, we pick a given zip code in Fayette County and a given set housing characteristics and compute insurance costs for houses at various points of the housing price distribution. Homeowners' insurance costs are displayed in Appendix Table 2. In 2008, homeowners in the 10th percentile of the housing price distribution paid \$38 per month for homeowners insurance while homeowners in the 25th, 50th, 75th and 90th percentiles, respectively, paid \$44, \$52, \$65, and \$86 per month for homeowners' insurance.

Monthly data on electricity and gas bills are obtained from the utility financial reports produced annual by the Commonwealth of Kentucky Public Service Commission. The utility

financial reports include average monthly electricity bills for customers of Kentucky Utilities, the main provider of electricity for Fayette County. Kentucky Utilities serves areas besides Fayette County so the numbers presented may overstate or understate the true electricity of costs for its customers in Fayette County. The utility financial reports include data on the average monthly gas bills for customers of Columbia Gas of Kentucky, the main provider of gas for Fayette County. Because Columbia Gas of Kentucky serves customers in areas outside Fayette County, monthly estimates may overstate or understate the true natural gas costs of Fayette County residents. Again, all utility bills are measured in 2007 dollars. Monthly electricity bills were between \$58 and \$82 over the 1998 to 2008 period, whereas monthly natural gas bills were between \$65 and \$94 over the same time period (see Table 10). Data on monthly water bills were obtained from a sample water bill from the Kentucky American Water Company, the main water provider for Fayette County. Due to data limitations we assume that water bills were constant (in terms of 2007 dollars) over the 1998 to 2008 period. Monthly water bills are \$24 for the sample period (see Appendix Table 2).

Appendix Table 1: Distribution of Mortgage Payments and Property Taxes Paid

Year	Interest Rate	Monthly Mortgage Payment					Monthly Taxes Paid on Property				
		Housing Price Distribution Percentile					Housing Price Distribution Percentile				
		10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
1998	6.94%	\$585	\$713	\$927	\$1,312	\$1,816	\$70	\$86	\$112	\$158	\$219
1999	7.44%	\$616	\$760	\$986	\$1,418	\$1,989	\$70	\$86	\$112	\$160	\$225
2000	8.05%	\$673	\$826	\$1,047	\$1,509	\$2,148	\$71	\$87	\$110	\$158	\$225
2001	6.97%	\$613	\$752	\$959	\$1,348	\$1,910	\$71	\$87	\$111	\$155	\$220
2002	6.54%	\$599	\$745	\$951	\$1,345	\$1,975	\$72	\$90	\$114	\$162	\$238
2003	5.83%	\$557	\$710	\$905	\$1,267	\$1,878	\$73	\$93	\$119	\$166	\$246
2004	5.84%	\$556	\$732	\$938	\$1,320	\$1,931	\$74	\$97	\$124	\$175	\$256
2005	5.87%	\$565	\$747	\$963	\$1,331	\$1,961	\$80	\$105	\$136	\$188	\$277
2006	6.41%	\$605	\$789	\$1,014	\$1,423	\$2,042	\$81	\$105	\$135	\$190	\$272
2007	6.34%	\$572	\$761	\$986	\$1,399	\$2,020	\$80	\$107	\$139	\$197	\$284
2008	6.03%	\$518	\$710	\$913	\$1,278	\$1,854	\$76	\$104	\$134	\$187	\$272

Source: Authors' calculations from LBAR data and Fayette County Property Valuation Administrator

Appendix Table 2: Distribution of Insurance and Utility Costs

Year	Monthly Homeowners Insurance Costs					Monthly Utility Bills			
	Housing Price Distribution					Utility			
	10th	25th	50th	75th	90th	Electric	Gas	Water	Total
1998	\$37	\$41	\$48	\$60	\$76	\$64	\$65	\$24	\$153
1999	\$37	\$41	\$48	\$61	\$78	\$62	\$66	\$24	\$152
2000	\$38	\$42	\$48	\$61	\$79	\$58	\$74	\$24	\$156
2001	\$38	\$42	\$49	\$61	\$79	\$58	\$94	\$24	\$176
2002	\$38	\$43	\$50	\$63	\$83	\$64	\$66	\$24	\$154
2003	\$38	\$44	\$51	\$63	\$85	\$63	\$80	\$24	\$167
2004	\$38	\$44	\$52	\$65	\$87	\$66	\$86	\$24	\$176
2005	\$39	\$45	\$53	\$65	\$88	\$75	\$89	\$24	\$188
2006	\$39	\$45	\$52	\$66	\$86	\$75	\$82	\$24	\$181
2007	\$38	\$44	\$52	\$65	\$86	\$82	\$68	\$24	\$174
2008	\$38	\$44	\$52	\$65	\$86				

Source: Authors' calculations from anonymous insurance company website, Kentucky Utilities, Columbia Gas of Kentucky, and Kentucky American Water Company data