

The Effect of Demand and Supply factors on the Affordability of Housing

Jamie Davenport

I. Introduction

While the United States experienced its largest period of economic growth in history during the 1990s, some aspects of the economy did not fare as well. Low-income working families found it increasingly difficult to find adequate affordable housing despite the lowest national unemployment rate in history. The lack of affordable housing affects both the rental and homeownership housing markets. Whereas a booming local economy brings new jobs and more residents, it also brings and higher land values. Thus, higher rental rates and home prices created a lack of affordable housing in a strong economy. The difficulty in acquiring affordable housing affects more than just the low income households. According to a recent U.S. Conference of Mayors press release, “nearly 14 million households now spend more than half their income to cover rent or a mortgage” (USCM Press Release, 2002). The Department of Housing and Urban Development recommends no more than 30 percent of income be spent to meet housing needs (Song, 2000). The supply of affordable units continues to decline as landlords find it more profitable to convert government subsidized units into market-rate apartments and luxurious condominiums. The economic boom has resulted in the gentrification of once affordable neighborhoods forcing low-income residents to either pay more than the recommended share of income on housing costs or relocate to less adequate housing (Song, 2000).

Nationally, about one-third of households have difficulty finding adequate affordable housing.

In McLean County, the number is slightly smaller with nearly one-fourth of rental households unable to afford the county’s fair market rent (Community Action Network, 2002). It is important to examine the housing cost burdens of low-income households because as households are forced to spend larger percentages of income on housing, they have less income available for other necessities, like food, clothing, and health care. Therefore, the concern is not necessarily the rate at which housing prices are increasing but instead the reduced levels of spending on other basic necessities (Feldman, 2002).

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Locally, the issue of affordable housing is an increasing concern among residents especially considering forty-five percent of McLean County households with annual incomes between \$9000 and \$39,999 pay more than the recommended thirty percent of their gross incomes on housing costs (Community Action Network, 2002). This

paper uses supply and demand analysis to examine the housing market within twenty-eight metropolitan statistical areas (MSAs) in the Midwest. Examining trends of the housing market provides an opportunity to analyze which factors contribute to a shortage of affordable housing.

Specifically, this paper focuses on factors contributing to a MSA’s housing market and the share of homes affordable to households of median income as measured by the Housing Opportunity Index. Section 2 presents the theory and literature underpinning the concept of affordable housing. The empirical model is presented in Section 3 as a regression analysis of the supply and demand factors affecting housing affordability. The results indicate the overall economic

prosperity and income levels of a community to have the greatest effect on affordability. These results are presented in Section 4 with concluding remarks and policy implications in Section 5.

II. Theory and Review of the Literature

The housing market is different from other product markets for several reasons including necessity and importance. Housing satisfies the basic need for shelter and is often a household's single largest expense. In addition, few residences are exactly the same, creating a unique pricing structure with housing prices determined by factors such as size, number of bedrooms and baths, interior quality, age of home, age of roof, distance to city center, quality of local schools, and other neighborhood effects including the supply of housing. Households ultimately choose a home that "maximizes the household's utility subject to its budget constraints" (O'Sullivan, 2003).

The market is divided into submarkets such as older or newer homes. As the price of newer homes increases, households may choose instead to invest in an older home. Similarly, households must decide whether to rent or invest in owning a home. According to O'Sullivan, a household normally spends between two and three times its annual income when purchasing a home and are also required to make a large down payment. Because of this large investment, about one-third of American households are renters. The cost of housing is high whether renting or owning. The cost of renting is often higher because of relatively higher depreciation rates, higher interest rates to owners of rental property, higher maintenance costs, and various ordinances that keep housing costs high. Although renting is more costly, some households rent because low income prohibits them from affording a down payment or mortgage. Other households rent because they expect to move again soon. Affordability is the largest barrier homeowners and renters face when seeking shelter. The homeownership housing market will be the focus of this paper since the majority of American households choose to own their own home.

Affordable housing is defined as units affordable to households at or below thirty-five percent of the median household income. According to HUD, a household is cost-burdened if gross rental or housing payments are greater than thirty percent of household income. Within the rental market, the supply of affordable units is determined by the number of units

available in different rent categories or the number of units renting for less than a certain amount each month. The Joint Center for Housing Studies used a real \$300 rent indicator and found the number of affordable units declined between 1974 and 1993. On the other hand, the number of households only able to afford a monthly rent of \$300 increased (Bogdon, 1997).

Another method of examining housing affordability is the Housing Opportunity Index (HOI). This index, produced quarterly by the National Association of Home Builders, is based on the relationship of sales prices to local area incomes. HOI is calculated with estimates of median family income, the distribution of home sale price data, mortgage interest rates, and data on local property taxes and insurance (Chaluvadi, 2002). Historically, the Midwest is found to be the most affordable region within the nation. In the first quarter of 2002, nineteen of the twenty-five most affordable metropolitan areas were located in the Midwest with Elkhart-Goshen, Indiana having an HOI value of 94.9. In other words, a household with a median income in Elkhart-Goshen can afford 94.9% of the homes sold in the area. On the other end of the spectrum, a San Francisco household with median income can only afford 9.2% of homes sold within the area. Nationally, the HOI index has increased over the past decade from a value of 53.9 in 1992 to 64.8 in 2002 (NAHB, 2002).

The demand for housing is indicated by price, household income, household composition, job choice, and housing consumption. As the price of a particular quality of housing unit increases, households demand less of that quality housing. For that reason, as the housing cost burden of a household increases, the household must either find less costly housing or reduce consumption of other goods. The location of a unit is important when considering commute times and if the household includes children. Capital markets should also be considered when examining the demand of housing. As mortgage rates decrease, households may have a greater incentive to invest in purchasing a home as home ownership becomes more affordable and will therefore demand less rental units (Arnot, 1987).

Housing consumption is theoretically determined by factors affecting a community's overall economic well-being. As a city grows and per capita incomes increase, households demand more housing units and higher quality. Similarly, the population growth of a city has important consequences on the

availability of housing. More densely populated communities generally have smaller units located much closer together and lower per capita incomes. A higher concentration of households creates a greater competition for a limited number of housing units driving up the price of housing.

The supply of housing responds only partially to cyclical movements in demand because of lags in construction. As a result, rent or home prices moves pro-cyclically. The supply of housing is fixed in the short-run driving up the price of housing as demand increases during times of economic growth. Measuring the change in housing units over time provides an assessment of the supply of housing. Governments require building permits as a method to ensure proposed construction complies with health and safety codes. Building permits also provides a means of examining the increase in supply of new units and rehabilitation of existing housing. Examining vacancy rates provides a third measure of the housing supply. High vacancy rates suggest the demand for housing is low and thus, fewer housing units will be constructed.

Although observing the supply of housing units is helpful in determining if the aggregate supply of housing meets the needs of households, it does not account for the type of units available to households. The highest quality homes with the highest prices are unaffordable to the majority of the population. Kathryn Nelson, a researcher with the U.S. Department of Housing and Urban Development, concludes that the worst housing shortages occur among extremely low-income households, or households with incomes at or below thirty percent of the area median income (2001).

Somerville and Holmes developed a model depicting the movement of units into and out of the affordable market (2001). They found affordable units located in an area heavily concentrated with unaffordable housing units are more likely to become unaffordable themselves. This suggests neighborhood characteristics are more important in the movement of units between markets than individual housing unit characteristics or movements in market prices. Ron Feldman, Assistant Vice President of the Federal Reserve Bank of Minneapolis, describes a situation in which low-cost housing is created through filtering, or when the price of existing units falls as the unit's relative quality decreases (2002). This process is largely responsible for increases in the stock of low-cost housing. The problem, however, lies in the de-

clining quality of the housing units.

Numerous policies are in place aimed at increasing the supply of affordable units to households interested in renting or owning a home. Section 8 vouchers and low-income housing tax credits are two programs intended to make more units available to low-income household renters. Under Section 8, a household contributes thirty percent of its income toward rent, and the government pays the difference between this contribution and the fair market value. This creates an incentive for landlords to continue providing housing at fair market value because of the guaranteed income. A voucher program like this increases the demand for moderate quality housing causing the market price to increase because the supply of units is fixed in the short-run. Low-income households pay more for housing but also have more money to spend on housing with the certificates or vouchers (O'Sullivan, 2003). Therefore, affordability increases for the households with vouchers and decreases for households without vouchers.

The Low-Income Housing Tax Credit (LIHTC) issues tax credits for the "acquisition, rehabilitation, or new construction of rental housing targeted to lower-income households" (HUD). HUD describes the LIHTC to be the most important resource for creating affordable housing today. Created in 1986, the program has contributed to the addition of more than 838,000 housing units between its creation and 1999 (HUD USER Datasets, 2002).

The number of programs available to assist eligible households in purchasing a first home is plentiful ranging from help with closing costs and down payments to offering special low fixed interest rates. In Illinois, the Illinois Housing Development Authority (IHDA) with the help of the Fannie Mae Foundation provides 30-year fixed rate mortgages at rates between one and two percent below market rates to qualifying households. The savings can be substantial to households that take advantage of the various programs available. Requirements for eligibility within Illinois include maximum annual household incomes between \$93,100 and \$105,560 for a household of three or more people and equally generous purchase price limits (IHDA, 2002).

III. Empirical Model

A cross-sectional regression analysis is used to examine the supply and demand factors affecting the Housing Opportunity Index for twenty-eight met-

ropolitan areas in the Midwest. Appendix A illustrates the cities included in the study with their respective HOI values from the first quarter of 2002. These Midwestern cities were chosen based on available HOI data and to control for regional differences. Demand-side independent variables include income per capita, unemployment, density and population growth. Supply-side variables include permits per capita, percentage change in number of housing units, and vacancy rates. Table 1 illustrates the variable definitions with expected signs.

The HOI index comes from the NAHB and is only available for metropolitan areas during the first quarter 2002. Historical HOI values are not available but would be helpful in constructing a time-series model to examine trends over time. Instead, a cross-sectional approach with data from each metropolitan area comes from the US Census Bureau, the 1998 City and County Extra reference book, the Bureau of Economic Analysis, and the Bureau of Labor Statistics.

The independent variables have been divided into demand and supply-side variables. The income and unemployment variables are proxies for the overall economic well-being of each MSA. Per capita income levels are used rather than MSA economic growth rates because of a lack of data. Per capita income is taken from Census 2000 and unemployment rates from the Bureau of Labor Statistics. As a community grows and prospers, income levels increase and unemployment rates decrease. Research and historical data have shown that with prosperity comes

an increasingly difficult time at finding affordable housing. Population growth and density are taken from the 1998 City and County Extra and as a result reflect somewhat old statistics. However, it is assumed that these values do not change significantly over a rather short time. A community finds it more difficult to react to changes in the demand of housing with high population growth rates and thus, affordability decreases. Similarly, affordability decreases with higher density levels as households face greater competition in acquiring housing units which increases the price. In addition, higher density corresponds to higher land values increasing the cost of housing. Building permit data is available from the Real Estate Center at Texas A&M University on an annual basis dating back to 1980. Permit data were collected for 2001 to represent the building projects likely affecting the 2002 HOI. As the number of permits per capita increases, the price of housing should increase and affordability should therefore decrease.

The supply-side variables represent the structure of the housing market and the number of housing units available to households. The housing unit change variable is calculated from 1998 City and County Extra and Census 2000 data. As the supply of units increases, the price of housing decreases causing affordability to increase. The vacancy rate is calculated as the percentage of all housing units, both rental and ownership, that are not occupied. Vacancy rates reflect both demand and supply with very high vacancy rates reflecting an excess supply of housing and greater affordability.

Table 1: Variable Definitions

Dependent	
HOI	% homes affordable to med-income households
Independents	
<i>Demand-side</i>	
(-) Income	Per capita income 1999
(-) Unemploy	Unemployment rate 2001
(-) Density	Population density 1996
(-) Popchge	% Population change 1990-96
(-) Permits	Permits per capita 2001
<i>Supply-side</i>	
(+) Unitchge	% Change in housing units 1990-2000
(+) Vacancy	% Vacant housing units 2000

Source: NAHB, US Census, BLS, 1998 City and County Extra, Texas A&M

IV. Results

The results show little relationship between supply and demand-side variables and the Housing Opportunity Index. Table 2 illustrates the results from two regressions using data from all MSA's in the sample. In both regressions, the income coefficient is the most significant. As the economy grows and per capita incomes increase, housing affordability decreases.

Table 2: Regression Results

	Regression 1		Regression 2	
Constant	143.073	(.000)**	147.256	(.000)**
Income	-0.0021	(.037)*	-0.0025	(.001)**
Unemploy	-2.046	(.167)	-2.29	(.060)
Popchge	0.859	(.158)		
Density	-0.0113	(.450)		
Permits	-1867.45	(.186)		
Unitchge	0.0779	(.258)	0.0758	(.261)
Vacancy	-9.61	(.921)		
R ²	0.51		0.426	
Adj. R ²	0.338		0.354	
# of Obs	28		28	

significance levels in parentheses

** significant coefficient at 1%

* significant coefficient at 5%

Regression 1 includes all variables from Table 1. The income per capita proxy for economic growth has the correct sign and is the only significant coefficient. The population change, permits, and vacancy rate coefficients have incorrect signs. As population grows the affordability of housing should decrease rather than increase because more people are seeking housing units. Rather than measuring population change, a variable measuring the growth in number of households might be more helpful to take into account changes in household composition. The negative vacancy coefficient may be measuring very low quality housing units unsuitable to the median income household. On the other hand, the unit change coefficient has the correct sign even though it is not significant. As the percentage change in housing units increases, affordability increases for households of median income. The permit coefficient has the correct sign as one expects an increase in residential building permits to represent an increase in the demand for housing and therefore have a negative impact on affordability. A better measure for building permits might take into account the value of building

permits. If the average building permit is significantly greater than the median household income, then the number of housing units affordable to a household of median income falls.

Due to the number of variables in the model and limited degrees of freedom, the results from Regression 1 are unacceptable. Instead, Regression 2 illustrates the results with the demand-side variables income and unemployment and the supply-side variable unit change. These variables were chosen as the most important factors of supply and demand. Although the variables from Regression 1 are ideal for the model, degrees of freedom restricts the model to fewer variables. Each of the variables has the correct sign and has greater significance than in Regression 1. As a city becomes more prosperous with increases in income or decreases in unemployment, affordability decreases. As the percentage change in housing units increases, affordability increases. According to the adjusted R² value of 0.354, the second equation explains quite a bit for a study such as this one.

V. Conclusion

Although the results are not as strong as hoped for, the implications of supply and demand-side factors on the affordability of housing can still be realized. Metropolitan areas with higher levels of income generally have lower HOI values, or fewer homes affordable to median income households. Because income is such a significant component of affordable housing, programs and policies aimed at increasing household income while keeping housing prices relatively stable will offer the most assistance in making housing more affordable to median income households.

The empirical model presented in this paper examines the affordability of housing for median income households. However, the literature points to low-income households as the households most in need of more affordable housing. Because a lack of income is the ultimate problem in acquiring adequate housing for this income group, the need for programs aimed at increasing household income appears logical. The special interest rates and down payment and closing assistance offered by the Fannie Mae Foundation and IHDA, for example, are instrumental in allowing more households to become homeowners.

An empirical model that differentiates between median income and low income households would better examine housing affordability since the major-

ity of shortages in affordable housing occur among the lowest income groups. A greater understanding of the factors affecting affordable housing is important in the implementation of housing policies aimed at helping the households in greatest need of housing assistance.

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