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The Effect of Supply and Demand Factors on the Affordability of Rental Housing

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ABSTRACT

The difficulty of acquiring affordable rental units remains the most significant concern for low-income households. Despite the strong economic growth of the 1990s, one-third of all households spend more than the recommended thirty percent of their incomes on rental costs. These cost-burdened households face diminishing affordable rental units due to gentrification, rental rates increasing faster than real incomes, and the expiration of government subsidized rental units. The rental market is the focus of this paper since low-income households face the greatest barriers to acquiring affordable housing.

This paper uses an empirical analysis of the supply and demand factors affecting affordability as measured by the percentage of cost-burdened households in a metropolitan statistical area (MSA). The cross-sectional OLS regression uses data from 131 MSAs nationwide to examine the effects of household median income, fair market rents, population change, rental vacancy rates, percentage change in rental units, percentage of low- and high-income households, and percentage of low-rent or subsidized units. The results indicate the significance of income levels and demonstrate the need for increased effectiveness of housing policy to make housing more affordable to low-income households.

I.   INTRODUCTION

Though the United States experienced its longest period of economic growth during the 1990s, some of its citizens 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 recent history. The lack of affordable housing affects both the rental and homeownership housing markets (Quercia, 2002). Whereas a booming local economy brings new jobs and more residents, it also brings higher land values, thus higher rents and home prices, creating a lack of affordable housing in a strong economy. The difficulty in acquiring affordable housing affects more than just 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). In contrast, the Department of Housing and Urban Development (HUD) 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 formerly government-subsidized units into market-rate apartments and luxurious condominiums. The recent increase in conversion of these units is due to the large number of Section 8 contracts initiated in the 1980s with 20-year terms. In fact, 44 states have more than 50 percent of subsidized units expiring within the next few years (Opting In, 1999). The owners of these properties then have the choice of converting these subsidized units to the private market. The economic boom has resulted in the gentrification of once affordable neighborhoods forcing low-income residents either to pay more than the recommended share of income on housing costs or to relocate

to less adequate housing (Song, 2000). Kathryn Nelson, a researcher with HUD, concludes the worst housing shortages occur among extremely low-income households, or households with incomes at or below 30 percent of the area median income (2001).

Nationally, about one-third of households have difficulty finding adequate affordable housing (Dolbeare, 2001). It is important to examine the housing cost burdens of low-income households because as households 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 rental rates are increasing but with the reduced levels of spending on other basic necessities (Feldman, 2002).

This paper uses supply and demand analysis to empirically examine the factors affecting the percentage of cost-burdened households in a metropolitan statistical area (MSA). From this study, I identify the primary causes of excessive spending on housing. These, in turn, suggest effective policy interventions. Section II presents literature underpinning the concept of affordable housing and Section III presents existing policies. Section IV explains the theory surrounding the submarkets of the housing market. I develop the empirical model in Section V to identify the factors affecting the percentage of cost-burdened households, and the results in Section VI indicate the significance of median income levels, fair market rents, and measures of rental supply. I conclude and discuss policy implications in Section VII.

II.   LITERATURE REVIEW

HUD defines a cost-burdened household as a household that spends more than 30 percent of its income on housing. In 1999, 50.8 percent of all rental households faced

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one or more housing problems such as cost-burdens, inadequate rental units, and overcrowding (Dolbeare, 2001). According to both the 1997 American Housing Survey and a 1991 "State of the Nation's Housing Report," the inability to secure affordable housing was listed as the most significant problem facing low-income rental households (Dolbeare, 2001 and Apgar, 1991). Using American Housing Survey data, Apgar finds that the number of cost-burdened low-income households in unsubsidized units more than doubled between 1974 and 1991.

Despite government programs to assist low-income households, the difficulty in securing affordable housing has worsened in recent years. Charting housing assistance since its beginning in 1937, the number of assisted households peaked in the mid-1990s at 5 million and has been decreasing ever since (Dolbeare, 2001). The decrease reflects the demolition and sale of public housing and subsidized housing units and also federal housing policy that increasingly benefits wealthy homeowners over low-income households. Indeed, if the government had put into effect the various housing policies proposed by past administrations, over 12 million households would now be in federally assisted housing (Dolbeare, 2001). Thus, the lack of low-income housing programs available has been one factor responsible for the lack of significant progress in assisting the nation's poorest households.

Since 1991, the number of rental households with worst-case housing needs, or rental payments greater than 50 percent of income, increased by nearly 12 percent compared to an increase of 7 percent for all households (Rental Housing Assistance, 2002). In addition, worst-case housing needs among households with full-time earners increased more than three times faster than very-low-income households.

Studies examining the number of affordable rental units for low-income households have found significant rates of decline. The Joint Center for Housing Studies, using a $300 rent indicator, adjusted for differences in the price level, found the number of affordable units declined between 1973 and 1993 by 2.2 million units (Bogdon, 1997). On the other hand, the number of households only able to afford a monthly rent of $300 increased (Bogdon, 1997). A HUD study found a 5 percent decline (370,000 units) in the number of rental units affordable to families with incomes below 30 percent of the median income between 1991 and 1997 (Rental Housing Assistance, 2002).

Some researchers have explored factors that might cause a decline in affordable housing units. Somerville and Holmes developed a model depicting the movement of units into and out of the affordable market (2001). They find that 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 affordable and unaffordable markets than individual housing unit characteristics or movements in market prices.

The presence of a high-tech economy also has consequences for the local housing market as units that were once affordable move out of the affordable market. Units become unaffordable because of increasing economic growth that increases their rent or causes their conversion into more expensive, luxurious units. The economic prosperity and expansion of the 1990s created a housing crisis for many households with home prices and rental rates rising more than one and a half times faster than inflation (Quercia, 2002). Metropolitan areas with high-tech activity often experienced increased cost-burdens for all households. As an area grows due to the expansion of high-tech jobs,

income shifts more toward high-skilled workers and housing production becomes more concentrated at the high end of the market (Quercia, 2002). Although the high-tech economy creates increased problems of affordability for many households, it is felt most among the low-income, low-skilled households who do not benefit from higher wages and higher-quality rental units. The two factors determining availability of affordable housing, adequate income and sufficient supply of affordable units, have important consequences in a high-tech economy.

Another important factor affecting the supply of affordable units and growth of metropolitan areas include zoning practices. A Millenial Housing Commission study finds exclusionary zoning and "smart growth" strategies to have a negative impact on housing affordability (Cox, 2002). Exclusionary zoning limits the entry of low-income households into housing markets by establishing minimum lot sizes or prohibiting units such as apartments and manufactured housing. "Smart growth" strategies, intended to reduce urban sprawl, limit the amount of land available for development resulting in increases of home prices and rents because of the limited housing supply. Since adopting a "smart growth" strategy, Portland, Oregon experienced the greatest decline in affordability among metropolitan areas (Cox, 2002). These types of growth strategies reduce the supply of rental units affordable to low-income households.

Ron Feldman, Assistant Vice President of the Federal Reserve Bank of Minneapolis, gives another explanation for change in the supply of affordable housing. He describes a situation in which low-cost housing is created by the filtering of housing down to lower income markets as it ages and its quality decreases. (Feldman, 2002). The filtering process includes a decrease in a rental unit's quality over time from "physical

deterioration, technological obsolescence, and changes in housing fashion." As the quality decreases, the unit filters down from the high-income, high-quality market to the low-income, low-quality market. As the quality of the rental unit declines, households that demand less quality, generally with lower incomes, occupy the unit (O'Sullivan, 2003). This process is largely responsible for increases in the stock of low-cost housing. The problem, however, lies in the declining quality of the housing units.

III.   EXISTING POLICIES

Numerous polices in place are aimed at increasing the supply of affordable units to rental households. HUD offers programs ranging from housing vouchers to low-income tax credits while non-governmental organizations provide programs on a local level to assist low-income households. With Section 8 housing vouchers, a household contributes 30 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 higher quality rental units causing the market price to increase because the supply of units is fixed in the short-run. The low-income households pay more for housing but also have more money to spend on housing with the certificates or vouchers (O'Sullivan, 2003). Interestingly, even though rents increase, affordability increases for the households with vouchers but households without vouchers face less affordable housing choices.

HUD describes the Low-Income Housing Tax Credit (LIHTC) to be the most important resource for creating affordable housing today. Under this program, HUD issues tax credits for the "acquisition, rehabilitation, or new construction of rental

housing targeted to lower-income households" (HUD User Datasets – LIHTC, 2002).

While Section 8 vouchers center on the demand-side of the rental market, the tax credit

aides the supply-side by offering incentives to landlords and contractors. 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 - LIHTC, 2002). Another supply-side

program includes the HOME Investment Partnerships Program to increase the supply of

affordable housing to low-income households. Under this program, HUD allocates funds

to state and local governments to finance local housing programs. Since 1992, the

HOME program has created nearly 400,000 affordable low-income units (HUD, 2002).

In addition to the numerous other government programs aimed at increasing

affordability, non-governmental organizations play a significant role in increasing the

affordability of low-income housing. The Enterprise Foundation, for example, provides

consulting resources to government and community organizations to assist in the

planning, designing, assembling, and managing of affordable housing projects (Housing

Development, 2001).

Habitat for Humanity is a worldwide non-profit organization creating more than

45,000 affordable homes in the United States since 1972 (Habitat for Humanity

International, 2003). The homes are built with financial support from individuals,

corporations, and faith groups to provide housing at no profit to low-income households.

The National Coalition for the Homeless (NCH) is another non-profit organization

focused on eliminating homelessness and ensuring that every member of society has an

entitlement of "safe, decent, accessible, affordable, and permanent housing" (NCH

Housing Justice, 2003). The NCH engages in public education, policy advocacy, and

grassroots organizing to eliminate homelessness. A NCH study links the increases of high rent burdens to the increase of homelessness and the need for more housing assistance programs as evidenced by the long waiting lists for most government programs. For example, the average waiting lists for Section 8 housing vouchers increased from 26 to 28 months between 1996 and 1998 (America's Housing Crisis, 2003).

IV. THEORETICAL FRAMEWORK

The housing market is different from other product markets for several reasons, including housing immobility, durability, and the different sets of features of each unit such as size, location, and floor plan. Housing satisfies the basic need for shelter and is often a household's single largest expense. Because of housing's heterogeneous and immobile nature, the housing market is split into many different submarkets with different pricing structures in each market.
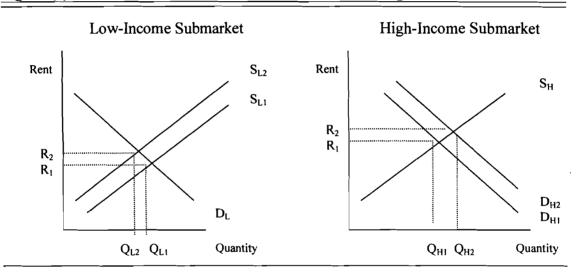
The price of housing will change if there are changes in factors affecting demand for or supply of housing. Demand factors influencing the price of housing include preferences for size, number of bedrooms and baths, interior quality, age of home, age of roof, utilities, distance to city center, and quality of local schools. Factors affecting the supply of housing units include the return to builders of new units and owners of existing units. If profits can be increased they will undertake new construction or conversion of existing housing to other, more profitable submarkets. Households will ultimately choose a home that maximizes their satisfaction given limited incomes (O'Sullivan, 2003).

A supply and demand analysis of the housing market best demonstrates the factors affecting cost-burdened households. A household normally spends between two and three times its annual income when purchasing a home and it is also required to make a large down payment (O'Sullivan, 2003). Because they are unable to afford this investment, about one-third of American households are renters. However, the cost of housing is high whether renting or owning. Indeed, the cost of renting is often higher because landlords have relatively higher property depreciation rates, higher maintenance costs, and they must comply with various ordinances. In addition, landlords pay higher interest rates on mortgages. Although renting is more costly, many 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 for both homeowners and renters when seeking shelter. However, the rental housing market is the focus of this paper, since low-income households face the greatest barriers in seeking affordable housing and thus are most likely to seek rental housing.

Each housing submarket represents a collection of units whose characteristics are viewed as closely equivalent by demanders and suppliers (Rothenberg, 1991). Units from different submarkets, such as high-income and low-income rental housing, are imperfect substitutes, but households move between the submarkets in response to price changes. As the price of high-income rental housing increases, landlords will build high-income rental housing in place of low-income rental housing. The high-tech economy provides an example of the effect of increasing high-income rental rates. With economic growth and prosperity, high-income households will demand more rental units and higher-quality units.

Figure (1) illustrates the effect of higher real incomes on low-income and high-income rental submarkets. An increase in income among high-income households will increase demand in the high-income market reflected by a rightward shift of D_{H1} to D_{H2} and a higher rental rate. In the low-income market, landlords find it profitable to convert low-income units to high-income units because of the higher rental rates in the high-income market. As a result, the supply in the low-income market shifts leftward from S_{L1} to S_{L2} as resources are transferred and the quantity supplied of high-income units increases, as shown by movement along the supply curve to Q_{H2}. The markets reach

Figure (1): Effect of an Increase in Income on Low and High-Income Submarkets

Low-Income Submarket   High-Income Submarket

equilibrium with an increase in high-income rental units, a decrease in low-income rental units, and higher rental rates in both submarkets. The percentage of cost-burdened households is likely to increase with the higher rental rates, especially for families that do not benefit from the new high-tech economy.

Factors influencing metropolitan housing affordability on the demand side of the market include median incomes, unemployment rates, population growth and density,

and a metropolitan area's degree of income inequality or the gap between the rich and poor. As per capita incomes increase, households demand more high-quality, high-income units which increases rent on low-income units as shown in the formal model. This increase in rents increases the percentage of cost-burdened households.

Increases in unemployment decrease the demand for rental units in both the low and high-income markets and cause unemployed individuals to have reduced income relative to the median income. Although higher unemployment decreases the demand, and thus the price of housing, it also increases the burden faced by households in acquiring rental units. Since housing is a necessity, a household faced with unemployment must choose either to increase its housing cost-burden or to find lower-quality rental units.

Population growth and density of a city have important consequences for the availability of rental units. As population increases, demand increases as well as the percentage of cost-burdened households because there are more households competing for the limited supply of rental units until additional units are constructed to meet the new demand. More densely populated communities generally have smaller units located much closer together and lower per capita incomes because low-income households cannot afford large plots of land and thus have smaller units. Therefore, the percentage of cost-burdened households should increase as population density increases.

Income inequality also affects housing affordability. Rich neighborhoods next to poor neighborhoods reveal the inequality within cities and the policy problems it signifies. Increasing income inequality can mean fewer public programs to help the poor because the growing upper class may find it less beneficial to support programs such as

homeless shelters and programs for affordable housing (Gubits, 2003). Inequality affects low and high-income markets differently. As the rich get relatively richer, their demand for high-income rental units increases, driving up those prices. As the poor get relatively poorer, they demand smaller and less expensive housing units and face increasing problems of affordability. Poor households must choose to become cost-burdened, homeless, or be forced to move from the community.

The supply of rental units responds only partially to increases in demand because of lags in construction. As a result, rent increases more in the short-run than in the long-run. The supply of rental units is fixed in the short-run driving up the price of rental units as demand increases during times of economic growth. Measuring the change in number of rental units over time captures both demand and supply side responses. The supply of rental units reflects the response of landlords and contractors to past price changes. As rental rates increase because of increases in demand, it becomes more profitable for contractors to build new units and the number of rental units increases.

Construction of rental units requires building permits as a method to ensure that proposed construction complies with health and safety codes. Thus, building permits also provide a means of examining the increase in supply of new units and rehabilitation of existing units. Similar to the measurement of unit change in rental units, the number of building permits acts in response to both demand and supply. As households demand more housing units, building permit activity reflects the increased supply of units available.

Vacancy rates provide a third measure of housing supply relative to demand. High vacancy rates suggest the demand for housing is low relative to supply. Figure (2)

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illustrates the surplus of housing found with high vacancy rates. The surplus occurs at R_1

with Q_1 units occupied and Q_2 units available. At R_1, fewer households demand rental

units than are being supplied. The surplus disappears because of downward price

adjustments, which cause some existing units to be taken off the market. In the long run,

contractors respond to the high vacancy rates by constructing fewer rental units.

Figure 2: High Vacancy Rates

V. EMPIRICAL MODEL

I use a cross-sectional OLS regression analysis of 130 metropolitan statistical

areas (MSAs) to examine the demand and supply factors affecting the percentage of cost-

burdened households, or households spending more than thirty percent of their incomes

on rental housing. The MSAs vary in regional location and size. Their population ranges

from 250,000 to over 9 million. I use data from the 2000 U.S. Census and the

Department of Housing and Urban Development to estimate how the changes in the

rental housing market affect the percentage of cost-burdened households. Table (1)

illustrates the variable definitions with expected signs.

The percentage of cost-burdened households comes from the Census 2000

Supplementary Survey. Households with gross rents greater than 30 percent of income

Table 1: Variable Definitions

Dependent	
Costburd	% households with gross rent > 30% of income
Independents	
Demand-side	
(+) Income	Median household income 2000 (in 1000s of dollars)
(+) Unemploy	% Unemployment rate 2000
(+) FMR2bed	Two bedroom fair market rent 2000 (in dollars)
(+) Popchg	% population change 1990-2000
(-) Pctlow	% households in lowest 20% national income bracket 1999
(+) Pcthigh	% households in highest 20% national income bracket 1999
Demand & Supply-side	
(-) Vacancy	% Rental vacancy rate 2000
(-) Unitchg	% change renter-occupied units 1990-2000
Supply-side	
(-) Lowunits	% Section 8 or low-rent units

Source: Census 2000 Supplementary Survey, HUD, State of the Cities Data System (SOCDS)

are said to be cost-burdened. The data values range from nearly 30 percent of cost-burdened households in Appleton, Wisconsin to nearly 57 percent in Santa Barbara, California.

The independent variables have been divided into demand and supply-side variables for a simple evaluation of market effects. The *Income* variable, taken from the Census 2000 Supplementary Survey, is a measure of median household income. As a community grows and prospers, median income levels increase. However, the effect on cost-burdened households is difficult to predict. If the new prosperity occurs only in higher income households then the increase in median income may increase the percentage of cost-burdened households. However, if prosperity improves income for households below the median as well, then the percentage of cost-burdened households may decrease. A study examining the high-tech economy boom of the 1990s found cost-

burdens to increase for all households, especially moderate-income working households, despite rapid economic growth and record low unemployment levels (Quercia, 2002). Because of this research, I hypothesize that increases in median income levels will increase the percentage of cost-burdened households. During the technology boom, income among low-skilled workers decreased from 1991 to 1997 while some higher-skilled occupations, such as teachers and law enforcement officers, experienced wage increases that barely grew with the rate of inflation.

Unemployment data, taken from the Census 2000 Supplementary Survey, serve as a proxy for economic prosperity in a metropolitan area. As unemployment rates increase, the percentage of cost-burdened households will increase as unemployed household income falls relative to the median income.

Fair market rent (FMR) data, collected from HUD, are a gross rent estimate of a two-bedroom unit including all utilities. FMR is calculated as the 40th percentile of standard quality rental units and determines the amount of financial assistance awarded to qualifying households in rental housing assistance programs, such as Section 8 housing vouchers. Increases in rental rates are highest in west coast metropolitan areas and also areas of the strongest economic growth (Landis, 2002). The percentage of cost-burdened households increases as FMRs increase.

The measure of population change reflects the percentage change from 1990 to 2000 as measured by the State of the Cities Data System (SOCDS). The expansion of rental units in metropolitan areas with more rapid population growth is more difficult. Therefore, low-income households may face increasing problems of housing affordability, resulting in higher percentages of cost-burdened households.

Pctlow represents the percentage of households in the lowest 20 percent of national income and serves as a measure of poverty while *Pcthigh* represents the percentage of households in the highest 20 percent of national income. Together, *Pctlow* and *Pcthigh* provide a means of examining the effects of income inequality. An increase in the percentage of low-income households could result in either an increase or decrease in percentage of cost-burdened households. On one hand, an increase in poverty may bring about more government assistance to cost-burdened households. But on the other hand, an increase in poverty not accompanied by any increased assistance increases income inequality within the metropolitan area and may cause housing to become more unaffordable.

An increase in *Pcthigh* decreases affordability among low-income households resulting in an increase of cost-burdened households. If an increase in *Pcthigh* reflects an increase in income inequality within a metropolitan area, then the percentage of cost-burdened households increases. Income inequality is an important component of the model because the poorest households have lost real income and experienced increasing housing costs more than any other group in the past 25 years (Andrews, 1998). This method of examining income inequality was chosen as an alternative to the more common measure using income distribution over all quintiles because those data were not available. Although a strong correlation exists between *Income, Pctlow,* and *Pcthigh*, the variables remain in the model because of inequality's effect on affordability as past research suggests (Andrews, 1998).

Vacancy rates and the variable measuring percent change of rental housing units are a reflection of both demand and supply. They represent the structure of the rental

housing market and the number of rental units available to households. The vacancy rental rate, taken from the State of the Cities Data System (SOCDS), represents unoccupied rental units as a percentage of total rental units and indicates an excess supply of rental units. High vacancy rates suggest landlords or contractors will reduce the supply of rental units until the market returns to near equilibrium. As households demand more rental units, the surplus of units and thus, vacancy rates, decrease. As vacancy rates increase, affordability should increase and the percentage of cost-burdened households should decrease.

Calculated from SOCDS, unit change corresponds to the percentage change of renter-occupied units between 1990 and 2000. This variable is a reflection of both supply and demand because landlords or contractors build additional units in response to demand increases by households. As the percentage of rental units increases, the percentage of cost-burdened households decreases. Building permits are not included in the model because of the high correlation between permits and *Unitchg*.

The variable *Lowunits* was compiled from the Public Housing Agency Profiles (HUD User Datasets – Assisted Housing, 2003). Housing agencies for each of the metropolitan areas report the number of units classified as Low-Rent or Section 8. Therefore, *Lowunits* represents the number of subsidized rental units as a percentage of total rental units to account for differences in size of metropolitan areas. As the percentage of subsidized units increases, the percentage of cost-burdened households decreases. Because housing agencies update the number of subsidized units on an ongoing basis, data are not available for the number of subsidized units in a single year. Rather, the collected data represents the percent of subsidized units as of this year.

Nevertheless, this variable may still offer insight into the effect of housing assistance programs on affordability.

VI.   RESULTS

The results in Table (2) illustrate the relationship between these supply and demand factors and the percentage of cost-burdened households in a given metropolitan area. The three regressions include a sample size of 130 MSAs and offer three variations of the model presented in Section V. Regression 1 includes all variables mentioned and yields an adjusted R^2 of .306. Given the type of study, the results provide insight on housing policy and suggest policies that might decrease housing cost-burdens.

Initially, I hypothesized *Income* to have a positive sign because of past research indicating the trend of rents rising faster than income levels due to the effects of high-tech economic growth on metropolitan areas (Orr, 1999). As income shifts more toward high-skilled workers, there is an increase in median income. Housing production becomes more concentrated at the high end of the market and gentrification of once affordable neighborhoods can occur as posited in the formal model. In the regression, however, *Income* has a negative sign signifying that as median income increases, the percentage of cost-burdened households decreases. This result could suggest a decline in the dispersion of income at the lower income levels. Although different from the expected sign, this result is highly significant `and indicates that efforts to increase median income levels will increase affordability for low-income households. This result is especially interesting because it contradicts previous work that found a positive relationship. However, if median household income is increasing because of high-tech

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Table 2: Regression Results (Dependent Variable = Costburden)

Variable	Regression 1		Regression 2		Regression 3	
Income	-1.1120	**			-.5478	**
	(.000)				(.000)	
Unemploy	.0819		.2290		-.0815	
	(.314)		(.343)		(.307)	
FMR2bed	.0160	**	.0177	**	.0225	**
	(.006)		(.007)		(.005)	
Popchg	.0869		.2050	*	.1660	*
	(.082)		(.086)		(.079)	
Pctlow	-.4010	*	.1900			
	(.206)		(.189)			
Pcthigh	.6990	**	-.3840			
	(.278)		(.200)			
Vacancy	-.5810	**	-.6420	**	-.6980	**
	(.216)		(.237)		(.218)	
Unitchg	-.1270		-.2920	**	-.2510	*
	(.109)		(.115)		(.104)	
Lowunits	-.8246		-.2760		-.2360	
	(.281)		(.307)		(.274)	
F-statistic	7.368		4.110		7.777	
Adj. R^2	.306		.161		.267	
# of Obs.	130		130		130	

Standard errors in parentheses

** significant at the .01 level   * significant at the .05 level

economic growth that passes over low-skilled, low-income households, then a measure of median income among low-income households may produce the expected positive sign.

Regression 2 removes *Income* because of the strong correlation between *Income*, *Pctlow*, and *Pcthigh*. The results of Regression 2 suggest the *Income* coefficient is robust while the coefficients of *Pctlow* and *Pcthigh* are quite fragile. The percentages of households in the lowest and highest 20 percent national income bracket are no longer significant and have opposite signs. Overall, the regression explains considerably less with an adjusted R^2 of only .161. Regression 3 removes *Pctlow* and *Pcthigh* from the

original regression to compare results and confirm the negative sign of *Income* in Regression 1. The magnitude of *Income*'s negative coefficient increases and the sign of the unemployment coefficient is incorrect although not significant. The results of Regressions 2 and 3 suggest Regression 1 is the best regression for interpreting the effect of each factor on the percentage of cost-burdened households.

The Fair Market Rent coefficient is highly significant with the correct sign indicating that as FMRs increase, affordability decreases as shown by an increase in the percent of cost-burdened households. For example, a $100 increase in FMR will increase the percentage of cost-burdened households by 1.6 percentage points. FMR data across the sample differ significantly, from $400 in Lafayette, Louisiana to over $1300 in San Francisco. *FMR2bed* is highly correlated with *Income* but remains in the model because both are highly significant.

Vacancy is also highly significant with the correct sign. As vacancy rates of rental units increase by 1 percent, the percent of cost-burdened households decreases by .581 percentage points. A surplus of rental units, as measured by vacancy rates, will create a downward rent adjustment increasing affordability. The results support this theory and this variable has a significant effect in determining the percentage of cost-burdened households. Similar to *Vacancy*, *Unitchg* has the correct negative sign but is not significant. As the percentage of renter-occupied units increases by 1 percent, the percent of cost-burdened households decreases by .127 percentage points. This variable is different from *Vacancy* because it accounts for the growth in rental unit stock.

Pctlow is significant and suggests as the percentage of low-income households increases by 1 percent, the percentage of cost-burdened households decreases by .401

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percentage points. While reducing cost-burdens is the goal, the effect of this negative relationship also includes the emergence of urban ghettos as low-income households group together resulting in lower property values and thus, lower rents. A higher percentage of low-income households may also signify greater housing assistance as resources shift from the high-income submarket to the low-income submarket.

Pcthigh is also highly significant suggesting a 1 percent increase in the percentage of high-income households increases the percentage of cost-burdened households by .699 percentage points. As the percentage of high-income households increases, demand for high-income rental units increases causing rents to rise and resources to move from the low-income market to the high-income market. Low-income households must face higher rents, and thus, more households are likely to become cost-burdened. This result supports the evidence of increasing income inequality and the decreasing affordability of rental housing among low-income households since the 1980s (Andrews, 1998).

The unemployment coefficient has the correct positive sign in Regression 1 but is not significant. As unemployment increases by 1 percent, the percentage of cost-burdened households increases by 8.187 percentage points. The sign of the coefficient changes in Regression 3 suggesting the result is weak. However, it remains in the model because of the strong theoretical justifications suggesting the importance of unemployment on the demand for rental housing among low-income households.

Popchg is not significant but illustrates the effect of population growth on affordability. It might be more helpful to measure the change in number of households rather than total population to account for changes in household composition. However,

this new variable may be even more strongly correlated to *Unitchg* than the existing variable.

The coefficient for *Lowunits* is not significant and implies the percentage of cost-burdened households decreases .127 percentage points as the percentage of low-rent or Section 8 units in a metropolitan area increases by 1 percent. The lack of significance of this measure is perhaps due to the lack of reliability of the data source. The data include the current percentage of low-rent units rather than the percentage in 2000, and they are updated on a continual basis which therefore may distort the results.

VII.   POLICY IMPLICATIONS AND CONCLUSIONS

The results indicate that the percent of cost-burdened households falls with an increase in median incomes, an increase in the supply of rental units, a decrease in fair market rents, and a decrease in the percentage of high-income households. Several programs address these relationships. Fundamentally, income is the most important factor determining the affordability of housing. Quite simply, cost-burdened households must sacrifice income toward other necessities to acquire adequate shelter. A significant problem facing millions of low-income households across the country is the substantial gap between annual minimum wage earnings and the annual cost for a 2 bedroom unit at fair market rent (Dolbeare, 2001). The results of Section VI indicate the significance of increasing median income levels to obtain a reduction in the percentage of cost-burdened households and also offer an opportunity to examine the effectiveness of current housing policy toward low-income households.

Low-income working households need increases in the minimum wage to increase their income relative to the median income. Such a policy would reduce the

number of cost-burdened households. A study by the National Coalition for the

Homeless found that a worker earning minimum wage in a typical state must work 87

hours per week to afford a 2 bedroom apartment at 30 percent of his or her income

(America's Housing Crisis, 2003). One solution to the increasing gap between minimum

wage and the housing or living wage is the Earned Income Tax Credit (EITC Overview,

2003). The EITC provides a tax incentive to low-income working individuals by

reducing their Federal tax liability and sometimes offering a refund. Cushing N.

Dolbeare of HUD suggests the EITC should be increased to higher income levels to assist

low-income households to obtain affordable, adequate housing (Dolbeare, 2001). This

proposal is more favorable than a proposal to increase the minimum wage because it

avoids distortions in the labor market. Without imposing price controls, income levels of

low-income households need to increase at a comparable rate to rent increases. Programs

that focus on educating low-income households to allow them to move into higher wage

jobs would accomplish this end.

The positive and significant sign of *Pcthigh* suggests rising inequality worsens the

affordability of the cost-burdened household. Therefore, any programs that redistribute

income or in kind payments to the low-income household should have the effect of

reducing cost-burdens. One such program, Section 8 vouchers, allows households to

receive the difference between the household's 30 percent of income contribution and the

rental unit's FMR, the number of eligible units is declining because of substantial

contract expirations with participating landlords. In addition, while the waiting list of

thousands of low-income households continues to grow, Congress continues to reduce the

number of available vouchers. Currently, two-thirds of poor renter households do not

receive any housing subsidy and face housing cost-burdens (America's Housing Crisis, 2003).

Section 8 has been successful for families receiving the vouchers, however, the program's central failure is the shortage of vouchers available. The unit change and percentage of subsidized housing variables in the empirical model reinforce the importance of expanding the number of low-income rental units. Instead, the number of affordable housing units continues to diminish by more than 90,000 units each year (America's Housing Crisis, 2003).

The Low-Income Housing Tax Credit (LIHTC) and HOME programs should continue to expand to offset the number of the subsidized units lost to conversion or demolition. These supply-side programs offer incentives to landlords and contractors who provide affordable housing units for low-income households. As more low-income, subsidized units are available, affordability increases for low-income households, reducing their cost-burdens.

The results presented in Section VI suggest increasing median income levels has a negative impact on the percentage of cost-burdened households which differs from past research supporting a positive relationship. The past research examines metropolitan areas with high-tech economic growth and finds areas with high levels of growth have significantly more problems of housing affordability among all households (Quercia, 2002). The negative relationship found in this paper, accompanied by the effects of percentages of low and high-income households, suggests efforts to increase median income levels and decrease income inequality will have a positive effect on improving housing affordability among low-income households.

This study of cost-burdened households is important because it examines factors affecting housing affordability among low-income households. Continued attention at the national level is important to improve affordability among all households, especially low-income households. Since 1970, the percentage of income, on average, used toward housing has nearly doubled despite years of unprecedented growth (Andrews, 1998). Millions of households continue to struggle in the search of affordable rental units while the strong economy is the key factor pushing rent levels above income levels for low-income households. Simultaneously, low-income renters face a declining supply of subsidized units due to expiring Section 8 contracts declining housing assistance because of federal budget constraints. Most importantly, housing assistance should focus on programs aimed at increasing household income to reduce cost-burdens and provide low-income households with resources for other necessities.

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