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Forecasts of the Rental Housing Market in Metropolitan Chicago: Model and Preliminary Results

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Executive Summary

The purpose of this paper is to present forecasts of the rental housing market in metropolitan Chicago using alternative assumptions about the nature of the policies pursued by the Chicago Housing Authority regarding the relocation of current tenants in public housing in Chicago. The policy scenarios considered vary both by the total amount of households relocated out of public housing and by the spatial distribution of their new residences in the private housing market. Movement into the private housing is accomplished by the use of Section 8 rental housing vouchers.

The effects of the alternative policy scenarios are computed relative to a "base case" forecast for the housing market. In the base case the number of households in each area of the metropolitan area increases by the amount projected by the Northeastern Illinois Planning Commission, and rental vacancy rates are assumed to remain constant at their 1999 levels (as estimated by the UIC survey). The base case shows slow growth (0.2% per year) in households and rental units in the city of Chicago, slightly faster growth in the suburban areas of Cook County (0.4% to 0.9% per year), and sizable growth in the five collar counties (1.9% per year).

The policy scenarios assume that 6000, 2500, or 8400 households are relocated into private rental housing over five years (1999-2004). Three alternative spatial distributions of those relocating households are examined. The overall conclusion is that there are potential impacts on the rental market on the South Side of the city of Chicago that can be mitigated by a more geographically dispersed distribution of the relocating households. However, because average rents are lowest on the South Side, greater geographic dispersion could be more costly for the Section 8 program unless greater geographic dispersion can be translated into higher earned incomes for the relocating households.

Another portion of the paper describes an empirical study of building permits as related to vacancy rates and population growth for metropolitan areas in the midwest. The estimated relationship implies that building permits in metropolitan Chicago in the 1990-96 period fell short of the amounts that would have been expected.

Table of Contents

The Regional Rental Market Analysis Project Overview	**1**
1. Introduction	**5**
2. The Basic Approach: A Filtering Model of the Housing Market	**6**
3. Population Forecasts	**7**
4. The Base Case Forecast	**9**
5. Forecasting Model for Policy Scenarios	**11**
6. Building Permits in Metropolitan Chicago	**12**
7. Policy Scenarios: Chicago Housing Authority Plans	**15**
8. Forecast Results	**15**
9. Method for Estimating Housing Stocks for 1999	**18**
References	**20**
Tables	**21**

The Regional Rental Market Analysis Project Overview

Forecasts of the Rental Housing Market in Metropolitan Chicago: Model and Preliminary Results, is one of seven technical reports of the Regional Rental Market Analysis (RRMA), a broad examination of metropolitan Chicago's residential rental market. The RRMA contains a wide range of information necessary to craft innovative policies, programs, and investment strategies to address the future of the region's housing market. The Metropolitan Planning Council, serving as project manager, contracted with the University of Illinois at Chicago (UIC) to undertake this research with Washington, DC - based Urban Institute and the local Applied Real Estate Analysis.

Key findings from all seven papers are summarized in ***For Rent: Housing Options in the Chicago Region***, which includes a synthesis of supply and demand data, discussion of overlap and differences among providers and consumers, information about neighborhood trends, and forecasts of the rental market in 2004 and 2009. Detailed descriptions of the contents and methodology used in each of the seven technical reports are provided below.

1. ***Metropolitan Chicago Regional Rental Market Analysis: Rental Housing Supply Survey Report*** by Timothy P. Johnson, Martine A. Sagun, Jonathon Dombrow, Jin Man Lee, and Younk Ik Cho, Survey Research Laboratory, UIC.

   Summary of finding from survey of a stratified random sample of rental properties in the six-county region that asked for information on number of units (occupied and vacant); rents charged in 1998, 1999 and for new tenants; amenities included in housing cost; year building constructed; whether it contained an elevator; and if there was management on-site. Using tax assessor data from each of the counties, a universe of all residential properties was sorted by the likelihood of being renter- or owner-occupied based on tax status and other indicators. This list was further sorted by building type (single-family, small multi-family, large multi-family)

   From this database, a sample of 29,000 properties was randomly selected but stratified based on building type and location, and mailed or faxed questionnaires, contacted by telephone, or some combination of all three methods between April and July of 1999. In addition, a non-response survey of 300 randomly selected properties was conducted in July and August of 1999 to verify results from respondents and further clarify the eligibility rate of properties in the sample frame. At the close of data collection, 1852 interviews were completed representing over 45,000 units in the six county area. The final response rate of 14.1 percent was based on an overall eligibility rate of 45.1 percent..

2. ***Condition Survey: Chicago Regional Rental Market Analsysis*** by Robert Miller, Applied Real Estate Analysis, Inc.

Survey of over 1600 properties in the six-county region drawn from the survey sample during May of 1999. Properties were randomly selected to represent housing in three areas: City of

Chicago, suburban Cook County, and the collar counties (Kane, McHenry, Lake, DuPage, and Will). Trained fieldworkers using a questionnaire completed a visual inspection and assessment of building exteriors and surrounding neighborhoods, to assess overall housing quality and wheelchair accessibility.

3. ***Estimating Demand for Affordable Rental Housing in the Chicago Region*** by Janet L. Smith and Barbara Sherry, Urban Planning and Policy Program, UIC.

Estimates of aggregate households–families, individual adults, or non-related persons living together–at different income levels to determine potential rental housing demand based on affordability (paying no more than 30 percent of income toward housing costs) using household incomed projections from Claritas for the six-county region and each county. Data from the 1995 American Housing Survey was used to estimate the number and rate of households paying more than 30 percent of income for rent, living in overcrowded conditions, or in substandard housing. Additional data was collected and analyzed to learn more about the specific needs of different "demand groups" including persons who are homeless; who need accessible housing due to mobility limitations; who may be in need of affordable rental housing closer to work and employment opportunities; and who are likely to be affected by changes in Section 8, public housing and/or welfare. A wide variety of new and existing data sets are analyzed.

4. ***Providing Rental Housing in the Chicago Region: Challenges and Issues*** by Thomas J. Lenz and James Coles, Great Cities Institute, UIC.

Review of general literature of what is known nationally and locally about barriers and opportunities to provide rental housing, utilizing interviews with more than 40 key informants and five focus groups representing landlords, developers, public officials, and other experts on ;housing in the region. Focus group participants were selected randomly from the larger sample developed for the rental property survey and through outreach to rental property owner associations. The participants were stratified by their involvement in the Section 8 program and rents charged. Specific areas of focus included perceptions of the rental market and how it has changed in recent years; how the current market shapes landlord behavior; general attitudes toward lower-income renters; and specific knowledge of and experience with the Section 8 rent subsidy program.

5. ***Searching for Rental Housing in the Chicago Region*** by Susan J. Popkin and Mary K. Cunningham, The Urban Institute.

Review of general literature of what is known locally about barriers and opportunities to renting housing. Focus groups with families likely to be affected by public policy changes were used to hear about the experiences and perceptions of low-income renters. Participants included households renting apartments using Section 8 housing vouchers, families that tried to use but returned Section 8 vouchers, families currently on the waiting list for a voucher, and current Chicago Housing Authority (CHA) tenants likely to move into the private market using a voucher. This groups discussed current living conditions, understanding of and experience with the Section 8 program, their search process, and any difficulties they have encountered. CHA residents were also asked about their knowledge of CHA's redevelopment plans, their preferences for future housing, and familiarity with the Section 8 program.

6. ***Forecasts of the Rental Housing Market in Metropolitan Chicago: Model and Preliminary Results*** by John F. McDonald and Daniel P. McMillen, Center for Urban Real Estate, College of Business Administration, UIC.

   Modeling exercise that presents likely vacancy rates and rental variation fro 2004 and 2009. Estimates are also produced based on different scenarios regarding the number and likely destination choice of CHA tenants expected to relocate within the private rental market.

7. ***Housing Trends and the Geography of Race, Poverty, and Neighborhood Renewal*** by Thomas J. Lenz and James Coles, Great Cities Institute, UIC.

   Description of current patterns of racial segregation and poverty concentration in Cook County, which has most of the area's rental stock (79%), and analysis of socio-economic and investment data using maps with input from key informants in order to determine revitalizing areas. This report also explores different scenarios on how residents relocating from CHA units being redeveloped, whether permanently or temporarily, might affect existing neighborhood patterns and local housing markets.

The project was funded by numerous private and public sources, including the Chicago Department of Housing, Chicago Housing Authority, Chicago Community Trust, Field Foundation of Illinois, Inc., Lloyd A. Fry Foundation, GATX Corporation, Illinois Housing Development Authority, Bowman C. Lingle Trust, The John D. and Catherine T. MacArthur Foundation, Old Kent Bank, U. S. Department of Housing and Urban Development, Woods Fund of Chicago.

For more information about the Regional Rental Market Analysis or to request or download copies of the executive summary or of a technical paper, contact:

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1. Introduction

This report presents the housing market forecasting model and forecasting results that constitute a portion of the Chicago Regional Housing Market Study. The forecasts use 1999 as the

base year, and the forecast years are 2004 and 2009.

There are many ways to think about how the regional rental market might look in the future. A forecasting model is developed based on what we currently know about the market, and upon what we might assume is likely to occur in the coming years. The forecast depends upon the assumptions that are made. Generally speaking, the ability to predict at any level of detail diminishes as the time frame is extended.

The next section of the report is a brief discussion of filtering in the housing market. The filtering model is used in this project because it would be a mistake to consider a particular portion of the housing market in isolation. New construction in excess of demand growth will make units available and permit households to improve their housing. The next three sections describe the forecasting model that has been constructed as a spreadsheet program. Population forecasts from the Northeastern Illinois Planning Commission (NIPC) are discussed in Section 3, and our base case forecast is presented in Section 4. The base case forecast assumes that vacancy rates remain constant as demand grows. Section 5 discusses the forecasting model that is used to examine the effects of alternative public policies. A critical feature of the model is the response of housing supply (i.e., building permits) to reductions in the vacancy rate that are caused by policy actions.

Section 6 uses the econometric model of building permits estimated in Section 5 to examine the record of building permits in metropolitan Chicago and to generate forecasts of the housing market of the region in the aggregate. An important finding is that, in comparison to other metropolitan areas in the Midwest, building permits in Cook and DuPage Counties in the 1990s were fewer than would have been expected given population growth and housing vacancy rates. The estimated model predicts a significant softening of the housing market in the next decade, but it is evident that there are some constraints on the development of housing in metropolitan Chicago that may reduce the supply response.

Section 7 presents the nine alternative policy scenarios that are considered in this report. The nine scenarios combine three alternatives for the number of households that will move from Chicago Housing Authority units into the private market (with Section 8 vouchers) with three spatial distributions of those households. The following section presents the simulations of vacancy rates and rent increases by subarea for 2004 and 2009. The results section is followed by a section that outlines the methods used to estimate housing stocks and vacancies for the base year, 1999.

The basic findings in this report are:

- Population growth projections from NIPC indicate modest growth in the city of Chicago and in the subareas in Cook County, but sizable growth in the collar counties.
- New housing supply in a subarea responds strongly to population growth, and is smaller the larger is the initial vacancy rate.
- The movement of public housing residents to the private rental market can be expected to reduce the rental vacancy rate, increase rents, and stimulate some construction.
- The south side of the city of Chicago is the home of most of the relocating households, so the potential impacts on the private rental housing market are greatest in this area. These impacts can be reduced by a greater geographic spreading out of these households, but current rents are lowest on the south side. A policy that induces more geographic spreading out is likely to cost the Section 8 program more money

unless that geographic spreading out also results in an increase in earned income for the relocating households. Section 8 households pay 30 % of their incomes in rent, so an increase in earned income would mean that they would be expected to pay more of their own income towards rent.

2. The Basic Approach: A Filtering Model of the Housing Market

The basic approach to building a forecasting model for rental housing in metropolitan Chicago is an adaptation of the notion of filtering. The essence of this approach is to include all rental units in the model. The addition of a rental housing unit to the inventory (holding demand constant) makes a unit available and sets off a chain of moves of households that ultimately leads to a vacancy somewhere in the stock. It is probable that the chain of moves involves an improvement in housing quality for those households that move, and that the unit that becomes vacant is a unit that is of relatively low quality. See McDonald (1997, Chapter 8) for a detailed presentation of the filtering model.

As a beginning, suppose that all housing units in a subarea can be arrayed in a hierarchy from best to worst. The array goes from the fanciest mansion to the run-down, single-room apartment. Further suppose that households are arrayed in order of the amount of housing that they demand. Households with higher incomes demand more housing, so the order of the household array will be strongly correlated with income. The housing market assigns each household to a housing unit and determines prices for the various units. For concreteness, suppose that housing units can be grouped into two categories; higher quality and lower quality. These two markets are interrelated because they are markets for goods that are, to some degree, substitutes.

Consider the case of a subarea that can be characterized as a growth area. Such an area will experience growth in demand for housing units of higher quality, which will cause a declining vacancy rate, an increase in the overall stock through new construction, a declining stock of lower quality, low-rent housing (as some units are renovated), and rising real rents. It turns out that most of the five collar counties of metropolitan Chicago and the northern portions of Chicago and Cook fall into this category. Other zones in the metropolitan area can be characterized as zones with roughly static demand. The rest of Chicago and Cook County falls into this category. A static market is characterized by a constant vacancy rate, housing inventory, and real rents. Some units at the low end will be removed and replaced by other units that filter down. New units will be constructed that, in effect, replace the units that are removed. This is simply the natural aging process for a housing stock. However, it must be noted that the city of Chicago had been a declining market overall from 1970 to about 1990. Although quite modest in amount, population growth has occurred in the city in the 1990s for the first time since the 1940s. Table 1 shows population figures for the metropolitan area for 1990 and 1998.

3. Population Forecasts

Population forecasts for the metropolitan area and its subareas are included for the

information of the reader. The total estimated population of the six-county metropolitan area for 1999 is 7.83 million. Population is projected to grow by 3.80% from 1999 to 2004, and reach 8.13 million. The population in 2009 is projected to be 8.42 million, which means a growth of 7.59% in the ten years from 1999 to 2009. However, this growth is expected to be distributed very unevenly across the metropolitan area. Projected population growth figures for the city of Chicago, the rest of Cook County, and the five collar counties are as follows:

Area	1999 Population	Growth to 2004	Growth to 2009
Chicago	2.804 mil.	0.41%	1.01%
Rest of Cook	2.400 mil.	1.86%	3.72%
DuPage	.893 mil.	6.66%	13.32%
Kane	.400 mil.	9.80%	19.60%
Lake	.616 mil.	8.42%	16.83%
McHenry	.248 mil.	11.98%	23.40%
Will	.472 mil.	12.91%	25.82%

Population growth in the city of Chicago is expected to be a very small (but positive) number, while population growth in the rest of Cook County will be less than 4% in ten years. All five collar counties are expected to grow substantially, with the more remote counties (Kane, McHenry, and Will) expected to experience the greatest rates of growth.

The Northeastern Illinois Planning Commission (NIPC) provided detailed projections of annual population changes as shown in Table 1. Actually, one adjustment has been made to the NIPC population projections. The actual record (1990-99) for population change per year for the city of Chicago falls short of the NIPC projection by 5093 persons, while the NIPC projection for DuPage County falls short of the actual record by 5549 persons. Consequently, we assume that the annual population change for the city of Chicago is less than the NIPC projection by 5093, and that these 5093 persons will appear in DuPage County. This alteration of the NIPC projections makes our projections match the record for the 1990s pretty well.

The adjusted NIPC population projection indicates that the population of the city of Chicago will increase by 2294 persons per year, and that the rest of Cook County will grow by 8924 per year. Population growth in the five collar counties is expected to be 48,243 per year, so 81.1% of the population growth in the six-county metropolitan area is projected to be in the five collar counties. NIPC provides more details on this suburban population growth. We concentrate on the patterns of population and household growth within Cook County because these are the patterns that are most relevant for the policy simulations that follow.

NIPC also has prepared household projections that are consistent with their population projections. We have modified the NIPC household projections as well, and used these modified projections in our housing market model. Our modified household projections are as follows:

Area	1999 Households	Growth to 2004	Growth to 2009
Chicago	1.043 mil.	1.25%	2.40%

Rest of Cook	.887 mil.	2.62%	4.89%
DuPage	.321 mil.	7.05%	14.14%
Kane	.138 mil.	10.95%	22.13%
Lake	.218 mil.	9.93%	19.71%
McHenry	.087 mil.	13.16%	26.61%
Will	.157 mil.	14.04%	28.37%

Household growth rates are expected to be slightly larger than population growth rates because household sizes are falling. Therefore the number of households in the city of Chicago is expected to increase by 1.25% from 1999 to 2004, while population growth is expected to be only 0.41% over this same period. The reduction in household size is a factor that home builders must take into account. Household sizes projected for the metropolitan area are as follows:

Area	Household Size				
	1990	1999	2004	2009	2020
Chicago	2.72	2.69	2.67	2.65	2.61
Rest of Cook	2.72	2.70	2.68	2.67	2.64
DuPage	2.80	2.78	2.77	2.76	2.73
Kane	2.96	2.90	2.87	2.84	2.77
Lake	2.97	2.91	2.87	2.84	2.76
McHenry	2.91	2.86	2.83	2.80	2.74
Will	3.06	3.01	2.98	2.95	2.88

Household sizes are projected to fall by about 0.10 persons (or less) in Chicago, the rest of Cook County, and DuPage County, but the declines in the other four counties are in the range of 0.17 to 0.21.

It is important to remember that the number of households is equal to the number of occupied housing units by definition. Our projections for households (and therefore total occupied housing units) and for occupied rental units are (in millions):

Area	Households/Occupied Units			Occupied Rental Units		
	1999	2004	2009	1999	2004	2009
Chicago	1.043	1.055	1.067	.575	.580	.585
Rest of Cook	.887	.911	.931	.229	.234	.240
Five Collar Counties	.915	1.007	1.100	.217	.238	.262

The details of the projection methods are provided below.

4. The Base Case Forecast

The forecasting model is based on the assumption that we have estimates of the rental housing stocks and vacancies for the base year, 1999, for each subarea in the metropolitan area. We assume that all of the following variables are known (see Section 9 below for a discussion):

$$RS_{99} = RO_{99} + RV_{99} \quad (1)$$

where

RS refers to the stock of rental units,
RO refers to the number of occupied rental units, and
RV refers to the number of units available for rent.

In addition, the subscript 99 refers to the base year 1999. We therefore know the vacancy rates, such as

$$v_{99} = RV_{99}/RS_{99},$$

which is the rental vacancy rate for the area in question.

Our base case for the forecasting model uses the increase in the number of households for each area as projected by NIPC and holds the rental vacancy rate constant. It is assumed that the proportion of renter households remains constant in each area. These assumptions mean that RS, RO, and RV in an area all increase by the same percentage rate. This method is based on the assumption that the current vacancy rate is at the "normal" level at which there is neither an incentive to add units (beyond household growth rate) nor to reduce units. The vacancy rate as measured in the UIC survey for 1999 is a relatively low measure. Table 2 shows the rental vacancy rate as estimated by the Bureau of the Census for 1998 and prior years. The rental vacancy rate of 7.8% is quite high compared to the 4.2% estimated in the UIC survey for 1999. We believe that these two vacancy rates are different because of differing survey techniques. The Census Bureau includes vacant public housing units in its count of vacant units, and the UIC survey does not. Also, the Census Bureau and the UIC surveys may be using different standards regarding the definition of a habitable housing unit. At this time the full explanation for this discrepancy is not known.

Note in Table 2 that the Census Bureau's vacancy rate has been quite stable during the 1990s (a period of relatively rapid population growth), which suggests that the current vacancy rate, however measured, is close to the "natural" vacancy rate. As further evidence on this point, we used the UIC survey data to estimate the relationship between the vacancy rate in an area and the rent increase observed for 1998 to 1999. No relationship between the two variables was found, which suggests that the vacancy rates as observed are not generating rent changes. However, we assume that changes in a vacancy rate from the 1999 observed rate will generate changes in rent and housing supply.

The results of the base case projections for the metropolitan area as a whole are as follows (with units in thousands):

	1999	2004	2009
Rental Inventory	1066.8	1100.2	1134.5
Occupied Units	1020.7	1052.8	1085.7
Vacant Units	46.1	47.4	48.8
Vacancy Rate	4.3%	4.3%	4.3%

Note that there are over one million rental housing units in the metropolitan area (including the public housing in the all six counties), and that 46,000 of these units are vacant. These figures differ slightly from those reported in **For Rent: Housing Options for the Chicago Region** because of rounding errors. In particular we are working with a rental vacancy rate of 4.3% in 1999 rather than the 4.2% that is reported in **For Rent**. The discrepancies do not affect the nature of the results.

The results for the base case are shown for each area in Tables 3a and 3b. Table 3a shows the projections for the housing stock for three areas in the city of Chicago, three areas in suburban Cook County, and each of the five collar counties. The 25,000 occupied CHA units are not included in Table 3a. We see that the stock of housing in the suburban counties is projected to increase by 20.6% in the ten years from 1999 to 2009, while the increase in suburban Cook County is 4.5%. Housing units in the city of Chicago are projected to increase by 12,500 over these ten years (an increase of 2.2%).

Table 3b shows the projections for housing units, occupied units, and vacant units for the three areas in the city of Chicago, the three areas in suburban Cook County, and the five collar counties added together. These projections include the 25,000 occupied CHA units. The rental vacancy rate varies from 2.7% in the north side of Chicago up to 6.3% for the south side of Chicago. We see that 28,000 out of the total of 46,000 vacant rental units are in Chicago, and that 15,300 of these 28,000 are located on the south side of Chicago, which has a vacancy rate of 6.3%. The north side of Chicago has a low vacancy rate of 2.7% and 6,200 vacant units. The base case projection indicates that there will be a small increase in the number of vacant units in each area, and that the largest number of additional vacant units will be located in South Cook County (up 300 vacant units by 2009).

The policy scenarios considered in the following sections contemplate moving from 2500 to 6,000 up to 8400 households from the public housing in Chicago into the private market. We note that there is an estimated 28,000 vacant rental units in the city of Chicago as of 1999 (and another 6,200 in the southern and western suburbs of Cook County). If we take 34,000 vacant rental units as a base, then we are contemplating using 7% to 25% of the potentially available rental units (absent additional construction).

5. Forecasting Model

Our forecasting model for the housing market under various policy scenarios is based on the hypotheses that the forecasted percentage increase in the housing stock in an area is a function of the increase in the households that is projected for the area and the initial vacancy rate in the area. In equation form, we hypothesize a supply function over the forecast period stated as

$$\Delta RS/RS_{99} = \Delta HH/HH_{99} + \gamma\Delta v \qquad (2)$$

where "delta" indicates average annual change, HH means household, and γ is a parameter that is estimated using data for 1990-1996 for 94 counties in 10 metropolitan areas in the Midwest.

The study for the 10 metropolitan areas includes Chicago, Cincinnati, Cleveland, Columbus, Detroit, Indianapolis, Milwaukee, Minneapolis-St. Paul, Pittsburgh, and St. Louis. The measure of the change in the housing stock is the number of residential building permits issued in the year (expressed as a percentage of the total number of housing units). Data on building permits, housing starts, and completions are generally move together very closely, and the data on building permits are more readily available than the other measures. Basic statistics for the variables for the 94 counties are:

	Mean	Std. Dev.	Minimum	Maximum
Population growth rate	1.58%	1.37	-2.10%	5.15%
Bldg. permits (annual)	2.21%	1.36	.08%	6.03%
Overall vacancy rate	6.45%	3.13	2.93%	20.03%

The results of the estimation are:

$$\Delta TS/TS_{99} = 1.452 + 0.724(\Delta Pop/Pop) - .108v \qquad (3)$$
$$(10.56)\ (18.66) \qquad (6.37) \qquad R^2=.81,$$

where unsigned t values are in parentheses. The three estimated coefficients are all highly statistically significant. The equation generally yields satisfactory predicted values for the values of the dependent variable. For example, a subarea with a vacancy rate of 6% and population growth of 2% per year is predicted to have an annual increase in the housing stock of 2.25%. The equation predicts that a subarea with a 1% lower initial vacancy rate will experience 0.1% less increase in the housing stock, given a rate of population growth. This coefficient is used to adjust the rental housing stock in response to changes in the vacancy rate, which are caused by the policy of moving public housing tenants into the private rental market. In other words, when a certain number of households moves into an area (e.g., South Side of Chicago), the vacancy rate declines and the housing stock in the next year will be increased by 0.1 times the decrease in the vacancy rate.

The projections of the change in population for each area are provided by the Northeastern Illinois Planning Commission. The initial inventory and vacancy rate for 1999 are known. The model is used to make projections for the year 2004, and then projections for the year 2009 will be made using 2004 as the base year. The effect of the policy of moving public housing tenants into the private rental market in a given year is to reduce the number of vacant rental units (and increase the number of occupied units) by that number of households. The number of households in question is net of the number that are moved into other public housing units (existing and new replacement units). Equation (2) is then used to update the housing stock, occupied units, and vacant units, and the model is then ready to go on to the next year.

The final step is to turn the projected change in the vacancy rate into a change in the average rent. A well-known empirical relationship for rental housing [Rosen and Smith (1983)] is

that

Percentage change in rent = Percentage change in expenses + β(NVac - Vacancy Rate),

where β is the effect of the vacancy rate (to the extent that it is less than NVac -- the "natural" vacancy rate, as we explained above) on the change in average rent. The value of β for metropolitan Chicago estimated by Rosen and Smith (1983) is .6. We know from the UIC survey that the percentage change in rent from 1998 to 1999 was 3.72% (at a vacancy rate in 1999 of 4.2%). This means that a rental vacancy rate of 3.2% will lead to an increase in rent of 3.72 + .6x1 = 4.32% in that year.

6. Building Permits in Metropolitan Chicago

The empirical results from the previous section show that building permits (as a percentage of the housing stock) are very strongly related to two variables; the rate of population growth in the county and the vacancy rate in the county at the beginning of the period of the study. These results are important because they potentially provide the foundation for a forecasting model of a local housing market. Population forecasts for counties are readily available, and vacancy rate estimates can be obtained for the initial year. These two variables enable one to predict building permits, which translate into additions to the stock of housing units. A forecast of the future housing stock, coupled with a demand forecast, provides a means for forecasting future vacancy rates and rents.

In the course of conducting this study, we found that building permits in metropolitan Chicago in the 1990-96 period fell short of the number that is predicted by the econometric model that was estimated. It would seem that, compared to other metropolitan areas in the Midwest, metropolitan Chicago was adding to its housing stock at a rate that was well below what might have been expected. This empirical evidence is consistent with the hypothesis that some kinds of constraints on housing construction exist here that do not exist to the same degree elsewhere in the Midwest. **Providing Rental Housing in the Chicago Region: Challenges and Issues** by Lenz and Coles provides a further discussion of this issue.

Equation (3) above, when used to made predictions for the counties in metropolitan Chicago, overstate the volume of building permits. Some of the important counties in metropolitan Chicago have actual values for 1990-96 that are less than the ones implied by equation (3). These differences between the actual and computed values are:

Cook	-.271
DuPage	-.519
Kane	.117
Lake	.018
McHenry	.188
Will	-.255

The value of -0.217 for Cook County means that the equation says that building permits were

0.217% of the housing stock in the county greater per year than actually was the case. The largest "overprediction" is for DuPage County (by 0.519% of the stock per year), but the largest in absolute magnitude is, of course, the one for Cook. The weighted average of these differences (using population in 1998 as weights) is -0.165.

A more accurate prediction for metropolitan Chicago can be made if the constant term in equation (3) is adjusted downward by 0.165. Equation (3) now becomes

$$\Delta HS/HS = 1.287 + .724(\Delta pop/Pop) - .108(\text{Vacancy Rate}). \qquad (3')$$

However, this equation still predicts that building permits will exceed the recent historical record by 5,000 to 8,000 units per year for the six-county area. (Building permits have averaged just over 31,000 per year for the six-county area from 1993 to 1998.)

Using the population forecast from NIPC, a basic forecast can be made for the entire six-county metropolitan area. The forecast is based on the following data:

Total housing stock (1999)	2,977,000
Total vacant units (1999)	119,000
Overall vacancy rate (1999)	4.0%
Population growth rate (annual)	0.735%

The overall vacancy rate is provided for 1998 by the Bureau of the Census, and combines the estimated rental vacancy rate of 7.8% and the estimated owner vacancy rate of 1.5%. The forecast of the number of households (i.e., the number of occupied housing units) is also provided by NIPC. NIPC forecasts that households will grow by 0.849% per year.

The forecast makes the following assumptions:

- The current rental vacancy rate is 7.5% (down from 7.8% in 1998);
- The natural vacancy rate for rental housing is 9.8% (as defined by the Census Bureau) because this is the rate reported by the Census for both 1990 and 1995;
- The current and predicted numbers of units are based on Census measures, and not on the number of units measured by the UIC survey;
- Growth rates are based on NIPC projections.

The results of the forecast using equation (3') for the year 2004 are as follows:

Year	Units	Overall Vacancy Rate	Rental Units	Rental Vacancy Rate
1999	2977	4.0%	1166	7.5%
2004	3174	6.1%	1190	11.8%

The model predicts that additions to the stock will exceed the growth of the number of households, so the number of vacant units will increase substantially (assuming that the building permits become completed units).

An alternative is to assume that building permits will simply continue to be about 32,000 units per year for the next five years. In this case 160,000 units are built and the total stock becomes 3,137,000 in 2004 (rental units are projected to be 1,178,000). The number of vacant

units would be 156,000, and the vacancy rate would then be 5.0%. The rental vacancy rate implied by this forecast is 10.0% for 2004, which is close to the natural vacancy rate of 9.8%. The increase in the rental vacancy rate indicates a softening of the rental housing market in the Chicago region as supply responds to the relatively tight market of the 1990s.

If the model is pushed beyond 2004 it becomes unreliable. Instead of using the model, we assume that the housing market returns to its natural vacancy rate. The forecast for 2009 (in both cases) is for 3,109,000 households (and occupied housing units), of which 1,113,000 are renter households. A total of 1,234,000 rental units are on the market. This forecast assumes that the proportion of renter households continues to decline from 39.2% in 1999 to 37.5% in 2004 to 35.8% in 2009.

In this section we have used a model in which the annual amount of building permits (as a percentage of the housing stock) is a function of the annual population growth rate and the initial vacancy rate. This model fits the data for 94 metropolitan counties very well, but tends to "overpredict" the volume of building permits in Cook and DuPage Counties. Various constraints on housing development in these two counties are discussed elsewhere in the technical reports.

Use of the model, adjusted downward for its tendency to overpredict, still leads to a forecast for the metropolitan area of an increasing overall vacancy rate from 4% to 6% by 2004. This would represent a significant softening of the housing market, provided that the predicted supply is forthcoming.

One final point should be made about the data on building permits. In these data no distinction is made between rental and owner-occupied units.

7. Policy Scenarios: Chicago Housing Authority Plans

The model can be used to simulate the effects of alternative policy scenarios, and those results can then be compared to the base case simulation in Table 3. Policy scenarios have been prepared for this study with data provided by staff of the Management Analysis and Planning Department of the Chicago Housing Authority (CHA).

According to CHA data, the CHA currently owns a total of 38,716 units of public housing. Of these, 12,397 units are in developments for senior citizens or are scattered site housing. These two categories of units are not involved in the demolition and relocation program. The remaining 26,319 (14,516 occupied) units are located in the three areas of the city as follows:

	Units	Occupied Units	Occupancy Rate
North Side	4,154	2,556	39.3%
West Side	6,529	2,568	61.5%
South Side	15,636	9,392	60.1%

Most of the occupied public housing units are located on the south side of Chicago, so it is logical to presume that most of the relocating households will also come from the south side.

Those households relocating from public housing will come from these occupied units. Some of those households will be provided housing in other existing CHA units, while others will be provided with replacement units that are to be built. The policy of the U. S. Department of Housing and Urban Development is that demolition is to be coupled with the construction of replacement units equal to 40% of the number of occupied units demolished. Therefore, the critical information for our analysis is the net number of households that will be using Section 8 housing vouchers to relocate from CHA units into the private market.. After consulting with CHA staff, we use three possible policy scenarios as follows:

Scenario 1	6000 Section 8 households relocating over 5 years (1200 per year)
Scenario 2	2500 Section 8 households relocating over 5 years (500 per year)
Scenario 3	8400 Section 8 households relocating over 5 years (1680 per year).

8. Forecast Results

The forecasts results are based on three alternatives for the location pattern assumed by the relocating households. In the first case we assume that households relocate only to housing units located in the city of Chicago. The households relocate to the private market on the North, West, and South sides in the same proportions as their original locations in public housing. In the second case the households relocate to the city of Chicago and to suburban Cook County in accordance with the current spatial distribution of Section 8 voucher units. In the third case households are distributed across Chicago and Cook County according to the location of vacant units in 1999. No scenario was run in which some households are relocated from CHA public housing to suburban counties. It was our judgment, and of CHA staff as well, that few households would be relocated to the suburban counties. The effects on the rental housing markets in Chicago and Cook County reported below would be reduced if some households are relocated outside of Cook County.

The first case we examine (Case A) examines all three scenarios above, and is based on the assumption that the households will move out of public housing and into the private rental market in the same area of the city in the following proportions:

	Scenario 1	Scenario 2	Scenario 3
North Side	17%	20%	18%
West Side	17%	20%	18%
South Side	67%	60%	65%

Scenario differs from the other two slightly because of rounding.

The results for Case A are shown in Table 4. All of the results for show a similar pattern. The movement of households out of public housing and into the private rental market causes the vacancy rate to drop during the five years in which households are relocating. After 2004, when the relocation of households ends, the supply of housing continues to respond to the lower vacancy rate and causes the vacancy rate to rise. However, this increase in the vacancy rate does not bring

it back to its 1999 level by 2009. More time will be needed (in our model) to restore the vacancy rates to their original levels.

In all three scenarios the impact on the South Side rental housing market is the largest. For example, examine the South Side in Scenario 1 (6000 households relocated over 5 years). The current (1999) estimated vacancy rate is 6.3%, which will drop immediately to 6.0% as the first group of households moves (in 1999) out into the private market in the same area. The movement of households into the private market out to 2004, coupled with supply response, leads to a vacancy rate of 5.1% in 2004. Supply continues to respond to this lowered vacancy rate, and in 2009 the vacancy rate has increased to 5.6%.

The next step is to estimate the effects of the policies in Case A on rents. As an example of a particular type of rental unit, consider two-bedroom units in small, multi-family buildings. The UIC housing market survey produced the following mean rents for two-bedroom units in small, multi-family buildings:

	1998 Mean Rent	1999 Mean Rent	Increase
Collar Counties	$647.50	$668.53	3.25%
Cook North	$754.54	$770.04	2.01%
Cook West	$611.56	$636.75	4.12%
Cook South	$642.68	$656.30	2.12%
Chicago North	$781.83	$805.16	2.98%
Chicago West	$560.83	$588.58	4.95%
Chicago South	$500.26	$508.28	1.60%

Rents are lowest on the south and west sides of the city of Chicago. Also, the rent increase from 1998 to 1999 was lowest on the south side of the city (only 1.60%).

Our model says that rents will rise in each year that the vacancy rate is below the vacancy rate observed for 1999, and that this rent increase is 0.6 times this difference in the vacancy rate. The results in Table 4 show that these cumulative rent increases are significant on the south side. These rent increases up to 2009 for a two-bedroom unit with a rent of $500 per month in 1999 are as follows:

	Scenario 1 (6000 hh)	Scenario 2 (2500 hh)	Scenario 3 (8400 hh)
Rent increase	6.1%	2.3%	8.4%
Dollar amount	$30/month	$11/month	$42/month

It is clear that, in Case A, the relocation program will have discernable effects on the rental housing market on the south side, and that this effect will persist for several years. One way to mitigate these effects is to relocate some households more broadly in accordance with the current distribution of Section 8 vouchers. This option is Case B, which we examine next.

Case B allocates the relocating households to all areas in Cook County in accordance with the current spatial distribution of Section 8 voucher units. This allocation is as follows:

Chicago North Side	10.4%
Chicago West Side	16.6%
Chicago South Side	48.5%

Cook County North	5.5%
Cook County West	9.6%
Cook County South	9.3%

In short, Case B places 24.4% of the relocating households in the suburbs of Cook County, but the south side of Chicago still is the dominant location (as in Case A).

The results for Scenario 1 (6000 relocating households over five years) are shown in Table 5. In this case the vacancy rate in rental housing on the south side falls by 0.9% from 1999 to 2004, and then rises by 0.4% in 2009. The cumulative rent increase on the south side is 2.5% for 2004 and 4.5% for 2009. Discernable impacts also appear for Cook County West, Cook County South, and the west side of Chicago. Very little impact is seen on the north side of Chicago and Cook County North because these areas have very few Section 8 units. The effects on the south side of Chicago have been mitigated and the impacts spread over these other three areas.

Scenario 2 (2500 relocating households over five years) in Case B results in very little impact on any of the six subareas in Cook County. These results are shown in Table 6.

The results for Scenario 3 (8400 relocating households over five years) are shown inTable 7, and naturally are larger than for Scenario 1. The vacancy rate on the south side now drops by 1.3% from 1999 to 2004, and then increases by 0.5% in 2009. The cumulative rent increases in this area are 3.4% in 2004 and 6.2% in 2009. The effects on Cook County West, Cook County South, and the west side of Chicago are also larger than in Scenario 1.

The final case we examine, Case C, allocates the relocating households to the areas of Cook County according to the distribution of vacant rental units as of 1999. This allocation is as follows:

Chicago North Side	18.8%
Chicago West Side	20.6%
Chicago South Side	32.8%
Cook County North	7.0%
Cook County West	11.9%
Cook County South	9.0%

This case allocates more of the relocating households away from the south side of Chicago primarily to the north side of Chicago.

As shown in Tables 8, 9, and 10, the effects of Case C on the rental housing market of the south side of Chicago are reduced compared to Case B, but the effects on Cook County West and the west side of Chicago are somewhat larger compared to Case B. The vacancy rate on the south side in Scenario 1 (6000 relocating households) drops by 0.6% from 1999 to 2004, and then rises by 0.2% in 2009. The cumulative rent increases on the south side are 1.7% in 2004 and 3.0% in 2009. The up-and-down movements in the vacancy rates and the cumulative rent increases are actually slightly larger than these figures for Cook County South and the west side of Chicago. The results for Scenarios 2 and 3 are smaller and larger, respectively, compared to Scenario 1.

The basic lesson from the policy scenario simulations is that most of the relocating households currently reside on the south side of Chicago, and that the south side also contains a large fraction of the vacant rental units and the lowest rents in the metropolitan area. Distribution of the relocating households according to their current locations or according to the location of

available units will place large numbers of relocating households on the south side of Chicago.

9. Method for Estimating Housing Stocks for 1999

The forecasting model relies on knowledge of housing stocks and vacancies in the base year of 1999. Data on housing stocks for 1999 do not exist, but had to be estimated by updating the housing stock information in the 1990 Census of Population and Housing. This task also determines the weights to be applied to the samples obtained in the housing market survey portion of the overall Chicago Regional Rental Market Analysis. This section describes the methods used.

The 1990 Census provides data on housing stocks for Chicago, Rest of Cook County, and the five collar counties by type of structure, specified as

Single family
2-4 units
5-9 units
10 or more units.

The weights used in the 1991 American Housing Survey are used to allocate the stocks in Chicago and the Rest of Cook County to these subareas:

Chicago - North
Chicago - West
Chicago - South
Cook - North
Cook - Northwest
Cook - West
Cook - Southwest
Cook - South

Since there are five collar counties (DuPage, Kane, Lake, McHenry, and Will), we have 13 subareas and four building types (i.e., 52 cells). The 1990 Census and the American Housing Survey also tell us the proportion of housing units in each cell that is rented (or available for rental).

The next task is to update these housing stock data to 1999. Two sources of data were considered. The first source of data is information on real estate developments from 1990 to 1996 compiled by the Northeastern Illinois Planning Commission. However, we found that the number of completed housing units shown in the NIPC data falls far short of the increase in the number of households that is known to have occurred. The alternative is data on building permits for housing units for 1990-96 provided by the U. S. Bureau of the Census. These data are a better match with population and household growth that is known to have occurred. In particular, the Census Bureau estimates that population in the six-county area grew by 306,391 from 1990 to 1996. Building permits for the six-county area were 200,098 over the same period. The fact that building permits is fairly large compared to the population increase is explained by the fact that vacancy rates

outside of city of Chicago in 1990 were quite low - ranging from 3.9% to 5.1% (compared to 9.5% in the city of Chicago).

The building permits data are used to update the housing stocks to 1996, based on the assumption that the new units match the existing stocks in each area in terms of building types and owner/renter breakdown. The 1996 housing stocks are then updated to 1999 by assuming that an added 50% (for three more years) was added to the change in housing stocks for each area. These updated housing stocks for 13 areas and 4 building types are used as the weights that are applied to the samples obtained in the housing market survey of the overall project. The housing market survey provides us with vacancy rate estimates for rental units in each area in each type of building.

The final step is to estimate vacancies in the owner portion of the stocks for 1999. The American Housing Survey for 1991 provides the following data for the six-county metropolitan area:

Building Type	Proportion Vacant Units for Rent
Single-family	36.4%
2-4 units	96.0
5-9 units	95.8
10 and over	96.1
Overall	84.5

Note that nearly all vacant units in buildings other than single-family structures are rental units, and that 36.4% of vacant single-family units are available for rent. These proportions are used to convert vacant rental units into total vacant units, given the mix of building types in each area. We now therefore have estimates of housing inventory and vacant units for each area in total and broken down into the owner and rental categories.

References

McDonald, J., **Fundamentals of Urban Economics**, Upper Saddle River, NJ: Prentice-Hall, Inc., 1997.

Rosen, K. and L. Smith, "The Price-Adjustment Process for Rental Housing and the Natural Vacancy Rate," **American Economic Review**, Vol. 83, 1983, pp. 779-786.

Table 1

Population and Population Projections for Metropolitan Chicago: 1990-2009

Subarea	1990 (Census)	1998 (est.)	1999 (est.)	NIPC Annual Change	2004 (proj.)	2009 (proj.)
Chicago	2783726	2802079	2804378	2294*	2815848	2827318
North	1025667	1033009	1033927	NA	NA	NA
West	574967	578638	579097	NA	NA	NA
South	1183094	1190436	1191354	NA	NA	NA
Rest of Cook	2321318	2387610	2395896	8924	2440516	2485136
Northwest	350168	378266	381778	2091	392233	402688
North	623943	631559	632511	767	636346	640181
West	775026	772181	771825	1487	779260	786695
Southwest	167929	194641	197980	2260	209280	220580
South	404252	410963	411802	2319	423397	434992
DuPage	781689	880491	892841	11894**	952311	1011781
Kane	317471	391249	400471	7849	439716	478961
Lake	516418	605116	616203	10372	668063	719923

McHenry	183241	240945	248158	5945	277883	307608
Will	357313	459189	471923	12183	532838	593752

* Annual change over period 1990-99. NIPC projection is 7387 per year, but this projection does not match the actual record for 1990-99. Difference between NIPC projection and actual record for 1990-99 is 5093.

** NIPC projection is 6801 per year, but this projection does not match the actual record for 1990-99 of 12350 per year. Our projection adds 5093 to NIPC projection. See above note.

Table 2

Building Permits and Vacancy Rates in Metropolitan Chicago: 1990-1998

Year	Building Permits (units)	Vacancy Rate	
		Rental	Owner
1990		6.6%	0.8%
1991		7.3	1.5
1992		8.4	1.3
1993	29,359	7.3	1.1
1994	31,895	8.2	1.4
1995	30,757	7.9	0.8
1996	32.613	7.9	1.4
1997	29,951	8.2	1.5
1998	32,227	7.8	1.5

Metropolitan Chicago defined as Cook, DuPage, Kane, Lake, McHenry, and Will Counties in Illinois. Source: Northeastern Illinois Planning Commission.

Source: U. S. Bureau of the Census.

Table 3a

Base Case Projections of Rental Housing Stock
1999-2009

Total Rental Units

	1999	2004	2009
Chicago Total	577,200	583,400	589,700
Chicago North	216,900	219,200	221,600
Chicago West	120,900	122,200	123,500
Chicago South	239,500	242,100	244,700
Suburban Cook Total	238,600	243,600	249,300
Cook North	99,400	101,200	103,000
Cook West	77,900	79,000	80,200
Cook South	60,900	63,600	66,500
Collar Counties	226,000	248,200	272,500
DuPage	80,500	86,000	91,900
Kane	37,500	41,600	46,100
Lake	52,800	57,800	63,300
McHenry	23,100	26,100	29,600
Will	32,100	36,500	41,400
Region Total	1,041,800	1,075,200	1,111,400

Note: 25,000 currently occupied CHA units are excluded from the base. This table is identical to Figure 35 in **For Rent: Housing Options for the Chicago Region**.

Table 3b

Base Case Projections of the Rental Housing Market in Metropolitan Chicago
(Housing units in thousands)

Area	Year	Inventory	Occupied	Vacant	Vacancy Rate	Growth Rate
Collar Counties	1999	226.0	217.0	9.0	4.0%	1.888%
	2004	248.2	238.3	9.9	4.0%	
	2009	272.5	261.6	10.9	4.0%	
Rest of Cook	1999	238.6	229.2	9.4	3.9%	.465%
	2004	243.6	234.1	9.5	3.9%	
	2009	249.3	239.6	9.7	3.9%	
Cook North	1999	99.4	96.2	3.2	3.2%	.353%
	2004	101.2	98.0	3.2	3.2%	
	2009	103.0	99.7	3.3	3.2%	
Cook West	1999	77.9	74.5	3.4	4.4%	.286%
	2004	79.0	75.5	3.5	4.4%	
	2009	80.2	76.7	3.5	4.4%	
Cook South	1999	60.9	57.4	2.7	4.5%	.892%
	2004	63.6	60.7	2.9	4.5%	
	2009	66.5	63.5	3.0	4.5%	
Chicago	1999	602.2	574.5	27.7	4.6%	.214%
	2004	608.4	580.4	28.0	4.6%	
	2009	612.7	584.5	28.2	4.6%	
North Side	1999	230.8	224.6	6.2	2.7%	.214%

	2004	233.1	226.8	6.3	2.7%	
	2009	237.5	231.1	6.4	2.7%	
West Side	1999	128.9	122.4	6.5	5.0%	.214%
	2004	130.2	123.7	6.5	5.0%	
	2009	131.5	124.9	6.6	5.0%	
South Side	1999	242.5	227.2	15.3	6.3%	.214%
	2004	245.1	229.7	15.4	6.3%	
	2009	247.7	232.1	15.6	6.3%	

Table 4
Policy Simulation Results: Case A

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 1 (6000 households over 5 years)				
North Side	1999	2.6%	2.7%	
	2004	2.3%		0.9%
	2009	2.5%		1.7%
West Side	1999	4.8%	5.0%	
	2004	4.4%		1.7%
	2009	4.6%		3.0%
South Side	1999	6.0%	6.3%	
	2004	5.1%		3.4%
	2009	5.6%		6.1%
Scenario 2 (2500 households over 5 years)				
North Side	1999	2.6%	2.7%	
	2004	2.5%		0.5%
	2009	2.6%		0.8%
West Side	1999	4.9%	5.0%	
	2004	4.7%		0.8%
	2009	4.8%		1.5%
South Side	1999	6.2%	6.3%	
	2004	5.8%		1.3%
	2009	6.0%		2.3%
Scenario 3 (8400 households over 5 years)				
North Side	1999	2.5%	2.7%	
	2004	2.2%		1.4%
	2009	2.4%		2.5%
West Side	1999	4.7%	5.0%	
	2004	4.1%		2.5%
	2009	4.4%		4.5%
South Side	1999	5.8%	6.3%	
	2004	4.6%		4.6%
	2009	5.3%		8.4%

Table 5
Policy Simulation Results: Case B

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 1 (6000 housholds over 5 years)				
Cook North	1999	3.1%	3.2%	
	2004	3.0%		0.7%
	2009	3.1%		1.2%
Cook West	1999	4.3%	4.4%	
	2004	3.9%		1.4%
	2009	4.2%		2.5%
Cook South	1999	4.2%	4.5%	
	2004	3.7%		1.9%
	2009	4.0%		3.5%
Chicago North	1999	2.6%	2.7%	
	2004	2.5%		0.6%
	2009	2.5%		1.0%
Chicago West	1999	4.8%	5.0%	
	2004	4.4%		1.7%
	2009	4.6%		3.0%
Chicago South	1999	6.0%	6.3%	
	2004	5.4%		2.5%
	2009	5.8%		4.5%

Table 6
Policy Simulation Results: Case B

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 2 (2500 households over 5 years)				
Cook North	1999	3.2%	3.2%	
	2004	3.1%		0.3%
	2009	3.1%		0.5%
Cook West	1999	4.4%	4.4%	
	2004	4.2%		0.6%
	2009	4.3%		1.1%
Cook South	1999	4.3%	4.5%	
	2004	4.1%		0.8%
	2009	4.2%		1.5%
Chicago North	1999	2.6%	2.7%	
	2004	2.6%		0.2%
	2009	2.6%		0.4%
Chicago West	1999	4.9%	5.0%	
	2004	4.7%		0.7%
	2009	4.8%		1.3%
Chicago South	1999	6.2%	6.3%	
	2004	5.9%		1.0%
	2009	6.1%		1.9%

Table 7

Policy Simulation Results: Case B

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 3 (8400 households over 5 years)				
Cook North	1999	3.1%	3.2%	
	2004	2.9%		0.9%
	2009	3.0%		1.7%
Cook West	1999	4.2%	4.4%	
	2004	3.7%		2.0%
	2009	4.0%		3.6%
Cook South	1999	4.1%	4.5%	
	2004	3.7%		2.7%
	2009	3.8%		4.9%
Chicago North	1999	2.6%	2.7%	
	2004	2.4%		0.8%
	2009	2.5%		1.5%
Chicago West	1999	4.8%	5.0%	
	2004	4.1%		2.3%
	2009	4.5%		4.2%
Chicago South	1999	5.9%	6.3%	
	2004	5.0%		3.4%
	2009	5.5%		6.2%

Table 8

Policy Simulation Results: Case C

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 1 (6000 households over 5 years)				
Cook North	1999	3.1%	3.2%	
	2004	2.9%		0.9%
	2009	3.0%		1.5%
Cook West	1999	4.3%	4.4%	
	2004	4.0%		1.8%
	2009	4.2%		3.3%
Cook South	1999	4.2%	4.5%	
	2004	3.5%		1.8%
	2009	3.9%		3.1%
Chicago North	1999	2.6%	2.7%	
	2004	2.3%		1.0%
	2009	2.4%		1.9%
Chicago West	1999	4.8%	5.0%	
	2004	4.2%		2.1%
	2009	4.9%		3.7%
Chicago South	1999	6.1%	6.3%	
	2004	5.7%		1.7%
	2009	5.9%		3.0%

Table 9
Policy Simulation Results: Case C

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 2 (2500 households over 5 years)				
Cook North	1999	3.2%	3.2%	
	2004	3.1%		0.4%
	2009	3.1%		0.6%
Cook West	1999	4.4%	4.4%	
	2004	4.2%		0.8%
	2009	4.3%		1.4%
Cook South	1999	4.3%	4.5%	
	2004	4.0%		0.7%
	2009	4.2%		1.3%
Chicago North	1999	2.6%	2.7%	
	2004	2.5%		0.4%
	2009	2.6%		0.8%
Chicago West	1999	4.9%	5.0%	
	2004	4.7%		0.9%
	2009	4.8%		1.6%
Chicago South	1999	6.2%	6.3%	
	2004	6.0%		0.7%
	2009	6.1%		1.3%

Table 10
Policy Simulation Results: Case C

	Year	Vacancy Rate	Base Case Vacancy	Rent Increase
Scenario 3 (8400 households over 5 years)				
Cook North	1999	3.1%	3.2%	
	2004	2.8%		1.2%
	2009	2.9%		2.1%
Cook West	1999	4.3%	4.4%	
	2004	3.8%		2.6%
	2009	4.1%		4.6%
Cook South	1999	4.1%	4.5%	
	2004	3.2%		2.5%
	2009	3.7%		4.4%
Chicago North	1999	2.5%	2.7%	
	2004	2.1%		1.5%
	2009	2.4%		2.6%
Chicago West	1999	4.7%	5.0%	
	2004	3.9%		2.9%
	2009	4.4%		5.2%
Chicago South	1999	6.1%	6.3%	
	2004	5.4%		2.3%
	2009	5.8%		4.2%