DO FEDERAL FUNDS BETTER SUPPORT
CITIES OR SUBURBS?
A SPATIAL ANALYSIS OF FEDERAL SPENDING
IN THE CHICAGO METROPOLIS

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ABSTRACT

For more than fifty years, debates have raged over federal spending's effects on metropolitan growth and development. The federal interstate highway program and federal home lending policies have been frequently cited as encouraging sprawling development while discouraging investment in center cities. At the same time, others have claimed that the federal government is engaged in a "stealth" urban policy greatly favoring central cities, as federal redistributional programs have replaced those funneled through city governments. This paper examines the flow of federal dollars to the Chicago metropolis and finds that while Chicago and its older suburbs have gained from transfer programs, these dollars go almost exclusively to income supports. By contrast, federal programs that encourage wealth building have been heavily concentrated in the newer suburbs. The preponderance of federal spending on poverty alleviation has done little to encourage, or perhaps has even discouraged, private investment in other activities. Together these observations implicate federal policy in helping to facilitate the decentralization of population and the concentration of urban poverty.

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I. Introduction

The distribution of federal funds between central cities and their suburbs has long been a major source of controversy. City advocates have claimed that federal programs heavily subsidize suburban development. Others have argued that, on the contrary, Washington has steadily channeled transfer dollars into central cities and ignored newer suburban needs. On the surface, these debates have focused on the question: Who gets how much? But the argument has repeatedly hinted at a deeper set of issues; it may not simply be about how much a jurisdiction gets from the federal government but what kind of dollars it gets. To what extent has federal spending in cities and suburbs subsidized the real accumulation of private and public wealth? Where, on the contrary, have federal dollars simply gone to support consumption? Where have they lowered the effective price of land and housing so as to encourage wealth building through residential investment? Where have they simply subsidized rents? Where have they constructed public capital, roads and other infrastructure, so as to produce a continuous flow of public services?

In the 1950s, attention focused on the contribution of the Federal Housing Administration and its home mortgage guarantees. These guarantees made home ownership a possibility for a substantial segment of the country's lower-middle-class, urban population. These were mainly households that had experienced great difficulty borrowing from traditional credit sources before the Second World War. The FHA favored new housing construction that, in many metropolitan areas, could only be undertaken in suburbs near the periphery where land was plentiful, undeveloped and cheap. It also took a conservative attitude toward risk and as a result, redlined many central-city neighborhoods, and this further concentrated poverty in the urban core. Most researchers have concluded that the FHA, serving populations eager to escape high urban densities, directly undermined older urban communities, discriminated against minority households, and facilitated considerable suburbanization (Gelfand, 1975). From a slightly different perspective, these policies worked primarily to build wealth in the suburbs.

Highway construction, a second major federal priority, has also strongly influenced metropolitan growth and development. Especially with the development of the interstate highway system in the Eisenhower administration, federal highway spending opened a considerable amount of rural and semi-rural land to housing development. The metropolitan expressways encouraged automobile travel by making it easier to commute to, and escape from, the center city. There can be little doubt that in this period massive federal funding of highways opened up new suburban opportunities and helped keep residential land prices relatively cheap (Urban Transportation Center, 1999 and Boarnet, 2000). These low land prices underwrote further private residential investments in the new suburbs.

Several researchers have focused on the Reagan administration's hostility to cities. They cite a continuing shift in federal spending away from urban oriented programs, suggesting a renewed

emphasis on suburbs. This line of argument encouraged Robert Parker (1995, 1997) to use the Consolidated Federal Funds Reports in an effort to document total federal spending in central cities and suburbs. At least for the Reagan years Parker finds something of a "stealth" urban policy, as direct redistributional programs replaced those funneled through city governments.

From this synoptic review, it should be clear that federal policy toward cities and suburbs has engendered considerable debate over the last half century. It should also be noted that in much of this debate the precise nature of the object to be explained – suburbanization, sprawl, decentralization, urban decay, urban poverty – was often poorly defined or even undefined. Under the circumstances, conclusions have been impressionistic. Many of these debates are now the property of urban historians. In the present, however, we can gain a useful perspective on current national policy by carefully defining the character and geographic distribution of federal spending in metropolitan areas.

This paper examines the spatial distribution of federal funds in the Chicago urbanized area to clarify the role of federal spending in cities and suburban rings. To do this, we rely on data provided in the Consolidated Federal Funds Report[1] from two periods, 1989-1992 and 1993-1996. We then refashion the CFFR so that the spending programs are grouped according to their potential impact on places. In particular, the most important distinction among programs divides those federal funds that build an area's private wealth and public capital from those that subsidize current consumption. The wealth-building programs add to a municipality's future capacity to produce. For example home ownership subsidies add to the long run flow of housing services. Similarly federal subsidies for local infrastructure allow an area to produce a continuous stream of public services in the future. These programs are investments in the area's capital stock. On the other hand, those federal programs that subsidize current consumption have little or no long-term consequences. They may be appreciated by recipients, but they do not contribute to a municipality's overall level of production. They are short-term almost by definition.

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[1] The CFFR is an annual presentation of federal government expenditures for all states, counties and localities in the U.S.

II. PLACES, PROGRAMS AND METHODOLOGY

In order to properly examine federal spending in any region, we need to analyze two things: the spatial distribution of federal programs and the nature and objective of such programs.

A. Places: Defining the Rings of the Chicago Metropolis

Making the traditional distinction between city and suburb provides only modest information about where the federal dollars are flowing. In light of serious concerns over metropolitan residential and employment decentralization, the fine geography of federal expenditures and their influence on metropolitan form have been hotly debated. To provide a factual base for such debates, researchers require highly disaggregated data on the spatial distribution and programmatic content of federal expenditures. In general, the simple contrast between central city and suburbs will not suffice. In particular, data must be generated on the extent to which federal dollars do or do not support households, businesses and local governments in new peripheral locations.

The simplest approach would be to use county boundaries because the data is relatively easy to access. (See for example Stanback, 1991; Persky and Wiewel, 2000). However, while counties more distant from the central city will presumably be more newly developed, the relatively small number and large size of counties in many metropolitan areas virtually guarantees that some of them will contain both dense urban communities as well as developing ones. In addition, outlying satellite cities in remote counties can seriously confuse the picture. In general, counties are just too coarse a grid.

Going below the county level, the realities of data availability in the Chicago region strongly suggest using municipalities as our basic building block. But this choice still leaves open the question of how best to aggregate these many blocks up to an interesting analytical level. One approach followed by Myron Orfield (1997) and Daniel Immergluck (1998) has defined inner and outer suburbs in terms of the demographic characteristics of their populations – especially income levels. While this aggregation may be useful for a number of purposes, it fails distinguish between old suburbs and new suburbs over time. Indeed, affluent suburbs can be either old or new, and poor suburbs can be found in any of the rings and in satellite cities.

For the present study we have chosen to aggregate municipalities based on the date the U.S. Census Bureau classified them as part of the Chicago urbanized area. Roughly speaking, a municipality contiguous to the urbanized area becomes a part of that area when its density reaches 1000 people per square mile.   Grouping together municipalities by the date they qualified for inclusion combines a measure of age with at least some measure of density. Indeed, this is what we wish to track in this paper – federal spending in the metropolitan area and its potential and perceived impact on growth and development.

Therefore, we have grouped the urbanized area's municipalities as follows:

- Chicago proper.
- Pre-1950: Older Suburbs included in the urbanized area by 1950.
- 1950-1970: Middle Suburbs added to the urbanized area between 1950 and 1970.
- Post 1970: New Suburbs added to the urbanized area between 1970 and 1990.
- Satellites: Satellite communities.

The suburbs defined by 1950 were virtually fully developed by 1970. These are clearly older suburbs that, in general, share many of the assets and challenges of Chicago. These places probably have more in common with the center city than with newly developing places on the suburban fringe – which should be reflected in federal spending trends.

We make a distinction between two groups of newer suburbs. Those added to the urbanized area between 1950 and 1970 still had, at the later date, considerable opportunity for development into unincorporated areas. However, they already possessed significant physical and social infrastructure. Generally, the suburbs added after 1970 were truly peripheral in 1970.

Group 5, the satellites, includes all municipalities currently in the outlying urbanized areas of Joliet, Aurora, and Elgin, as well as Waukegan and North Chicago. The central cities of these satellite areas were developed in the late 19th and early 20th centuries. Thus their core land use was largely established before the post-World War II waves of suburbanization. For this reason alone, we should analyze them separately from newer suburban communities. We note that in recent years these satellite cities have experienced considerable growth and development as their suburban towns have been overtaken by the outer suburbs of Chicago.

Table 1 shows the population and land shares as of 1990 for each of the five rings in the urbanized areas of the region. Notice that the new suburbs entering the urbanized area since 1950 account for only 17.7 percent of the urbanized area population in 1990, but for 34.9 percent of the area's land. As a result their population densities are considerably lower than that of the city.

Table 1: Population and Area by Ring, 1990

	City	Pre-50	1950-1970	Post-1970	Satellites	Total
Population 1990 (in '000)	2783.7	2110.0	864.1	304.7	518.2	6580.7
Share 1990 Population	42.3%	32.1%	13.1%	4.6%	7.9%	100%
Area 1990 in Sq. Miles	227.2	489.9	300.2	186.3	192.4	1347.9
Share 1990 Area	16.3%	35.1%	21.5%	13.4%	13.8%	100%
Density, 000 per Sq. Mile	12.3	4.3	2.9	1.6	2.7	4.7

The borders of the Chicago urbanized area have been expanding rapidly. The 1990 census demarcated an area more than 400 square miles larger than that recorded in 1970, a gain of 41

percent in 20 years (Table 2). Not surprisingly, the new suburbs accounted for the lion's share of this expansion.

Table 2: Change in Area by Ring, 1970-1990

	City	Pre-50	1950-1970	Post-1970	Satellites	Total
Area Change in Sq. Miles	4.6	35.9	106.2	186.3	73.2	406.2
Area Growth %	2.1%	7.4%	54.7%	--	61.4%	41.0%
Share of Metro Area Change	1.1%	8.8%	26.1%	45.9%	18.0%	100%

Throughout this project we build, wherever possible, directly on municipality level data or estimates. This allows comparisons across a number of different systems of geographic aggregation.

B.   Programs: Recategorizing Federal Spending

Our strategy in approaching federal expenditures is to start as broadly as possible, then narrow down as appropriate. Paying attention to the entire range of federal expenditures in the urbanized area allows us to put the spatially relevant ones in some broader social perspective.

Not all federal programs are alike, but with thousands of individual programs we can hardly treat each one individually. Serious analysis requires some system of aggregation.   The problem becomes one of how best to aggregate. The large number of individual programs, in turn, means we can potentially find an infinite number of ways to disaggregate and re-aggregate federal spending. Any categorical system necessarily has an element of arbitrariness to it.

Previous research has not disaggregated federal spending as finely as necessary for this analysis. This survey makes use of data from the Consolidated Federal Funds Report (CFFR) at the municipal and detailed programmatic level. Where detailed data are not available, we have constructed a range of allocating models for disaggregating expenditures reported only at higher geographic levels. Fine disaggregation allows us to identify federal expenditure patterns across the Chicago urbanized area and measure the extent to which they favor or disfavor the newest suburbs on the region's periphery.

The most relevant previous work on differences in federal expenditures between city and suburbs (Parker, 1995, 1997) has built on the categorical system used by the CFFR. This system emphasizes the character of the recipient and the nature of the payment. Thus it distinguishes between direct payments to individuals, grants to institutions/governments, and procurement from private businesses. While useful for a number of purposes, such categories hardly have a well defined spatial impact. In this system, a highway construction grant and one to support the study of immunology both fall into the same category, and yet the first is far more relevant to housing costs than is the second. Clearly this system will not serve our purposes.

The three major divisions we make capture the basic distinctions between federal programs that stimulate local residential and related investments, programs that simply maintain consumption, and expenditures that support national objectives. By design the programs in the first group have substantial effects on wealth building across the metropolitan area. These programs influence not only the aggregate metropolitan accumulation, but also the spatial distribution of that wealth among municipalities. The second group includes all those programs primarily aimed at supporting consumption. As such these expenditures have only a modest effect on wealth accumulation or its spatial distribution. The programs in the last group serve national objectives. To the extent that expenditures in this category raise the level of economic activity in a metropolitan area, they may well stimulate regional capital accumulation of several types. However, these impacts are secondary to the efficiency considerations that presumably motivate the spatial distribution of federal spending of this type. Moreover, like programs under the heading of transfer payments, but unlike those in group I, these programs do not directly alter the relative cost of investment activity and other purchases.

Table 3 presents our functional approach to grouping federal spending categories.

Table 3: Federal Program Groupings

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1. Spatially Related and Wealth Building Programs

    a.   Cost Reducing
           1.   Highways and Related
           2.   Public Transit
           3.   Other Infrastructure
           4.   Income Tax Subsidy for Housing
           5.   Environment and Disaster
           6.   Crime

    b.   Poverty Relieving
           1.   Housing and Other Transfers to Low Income
           2.   Community Development and Other Housing
           3.   Education
           4.   Community Health

2. Transfer Programs

    c.   Non-Spatial Redistribution
           1.   Earned Income Tax Credit
           2.   Food Stamps
           3.   Redistributional Grants
           4.   Medical Assistance
           5.   Unemployment
           6.   Supplemental Social Security
           7.   Veterans

    d.   Retirement
           1.   Social Security and Other
           2.   Medicare
           3.   Veterans and Families

3. National Objectives

    e.   Salaries and Procurement
           1.   Salaries
           2.   Procurement

    f.   All Other
           1.   Agriculture and Related
           2.   Research
           3.   Arts
           4.   Other Health
           5.   Other Grants

As Table 3 indicates, each broad group is further disaggregated into smaller categories.

1.   Spatially Related and Wealth Building

a.   <u>Cost Reducing</u>

This category attempts to capture those programs that reduce costs and build wealth in municipalities. In one way or another all these programs provide incentives for residential investment and related private and public accumulation. Even if they do not determine where households choose to live, they have a powerful effect on how much households will invest once located. In this sense they are spatially related and contribute to the accumulation of capital in some municipalities and not in others. Chief among these programs is the income tax subsidy for owner-occupied housing. This category also includes highways, public transit, other infrastructure, environment and crime. These programs are included because they greatly reduce the private cost or local tax price of a range of goods strongly complementary to housing investment.

b.   <u>Poverty Relieving</u>

These spatially related redistributive programs are targeted directly at reducing the cost of housing or public infrastructure serving the poor. Heavily concentrated in the central city and the older core satellites, these programs deal with low-income housing subsidies, educational subsidies, community development and community health. These are programs that have a more or less clearly defined spatial component. While these federal dollars generate housing and other facilities for the poor, the resulting production remains highly specialized, may serve to further concentrate poverty, and perhaps even act as an impediment to some forms of private investment.

2.   Transfer Programs

c.   <u>Redistribution to the Poor</u>

These programs are similar to those in Poverty Relieving category in that they are redistributive, but they do not directly stimulate investment. This category includes: the earned income tax credit, food stamps, redistributional grants, medical assistance and unemployment compensation. These dollars raise the effective incomes of the poor, but have no direct influence on either savings or investment.

d.   <u>Retirement</u>

Like programs in the previous category, these federal expenditures take the form of transfers, but they are not targeted at the poor. This includes a range of retirement programs, specifically, Social Security, Medicare and payments to retired veterans and families. Again, these programs have no particular spatial component and can be expected to have little impact on private or public wealth creation.

3. *National Objectives*

e. <u>Salaries and Procurement</u>

This category includes the salaries of federal workers and all payments for federal procurement from local private firms in the area. As noted above, each of these sub-categories will undoubtedly influence investment on a metropolitan level. But presumably decisions about the location of federal facilities and the choice of federal contractors are made primarily in terms of national efficiency objectives.

f. <u>Other Grants and Miscellaneious</u>

In addition to programs for the arts, other grants, agriculture and related fields, this category includes research spending (e.g., aerospace or pharmacological sciences). Again, these programs are aimed at national objectives. And again, their local effects are felt through the level and spatial distribution of economic activity, not through changes in relative prices.

C. Methodology

Determining federal expenditures at the municipality level requires a good deal of perseverance and not a little hubris. The process quickly moves from one of data assembly to one of data creation. Many key numbers can only be generated through estimation, involving models of various levels of complexity. We save for the Appendix the more gruesome details of our efforts. Here, we will give an overview of the approach we have taken and the compromises we have made.

The basic data source for federal expenditures is the Consolidated Federal Funds Report. These data themselves are drawn from numerous sources, using sometimes conflicting geographic and program definitions. While the Census Bureau makes a yeoman effort to merge these data in a meaningful manner, there are especially pronounced problems with the data at the municipality level.

The most serious problems emerge when an agency reports an expenditure to a single municipality that represents federal dollars going to a multi-municipality or even regional activity. For example, federal contributions to the Regional Transportation Authority are recorded as an entry only for Chicago. Such entries require some alternative data source or estimating effort to allocate the federal funds among residents of all the municipalities involved. For both public transit and highways we undertook fairly substantial modeling. Our effort was motivated by a concern that, for these two key programs, it is critical to associate expenditures not with the physical locale in which they were made, but rather with the residents of the various municipalities in proportion to their utilization of the publicly provided capital. Thus a city highway may be used heavily by suburban drivers. In this age of reverse commuting the opposite can also hold. Transportation costs have a substantial impact on housing investment, but only a small share of a large transportation project's impact is felt in the project's immediate geographic vicinity. Rather the bulk of the effect will be in

the residential areas where commuters, who use that project, live. These are the households who see a change in the cost of commuting to work. These are the households who, as a result of the highway subsidy, may be stimulated to invest more in their homes.   Our estimates from these two models are discussed in more detail in the Appendix.

A number of programs are not disaggregated in the CFFR below the county level. In particular, a number of major redistribution programs such as food stamps and Medicaid lack municipal detail. Here we allocated each program's county expenditures using a statistical regression equation estimated for that program across all the counties of Illinois. For example, per capita food stamp expenditure by county is regressed on proportion of the population in poverty and the proportion of households with a female head. Both variables were found to be significant. A number of these equations, including most of the major redistributional ones, fit the county data very well. [2] However, several equations are not very reliable. In a few cases the results seemed so counter-intuitive that we resorted to a simple allocation within counties on a per capita basis. See the Appendix for more detail on all these equations.   To estimate per capita municipal expenditures, we simply used the cross-county equations along with information for each municipality on its independent variables. These data generally are taken from the 1990 Census. Estimated values for all the municipalities in a given county were then standardized to match that county's total.

CFFR data on a few programs are provided only at the state level. None of these programs, with the exception of unemployment payments, is very large. For each program, the state figure was allocated among municipalities based on an appropriate indicator. For example, unemployment payments were allocated in proportion to a municipality's unemployment to population ratio.

Unfortunately the CFFR lacks data on tax expenditures. In terms of our purposes here, we felt it essential to attempt to estimate two of the most important tax expenditures: income tax subsidies for housing and the earned income tax credit. The first clearly belongs in our category 1. The second is a significant redistribution program, and our catalogue in category 2 would be incomplete without it.

It should be noted that the present paper does not include information on the spatial pattern of federal loan activity. We are planning to look at this question in more detail in the future. Loans are excluded here because a number of federal loan programs and, most importantly, the Federal Housing Administration's extremely large mortgage guarantee program actually generated surpluses over the years in question (Office of Management and Budget, 1999).

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[2] Notice that since some of these redistributional programs at the county level are themselves estimated by the CFFR we may in these cases just be re-estimating their allocation formula.

III. FEDERAL SPENDING ACROSS THE CHICAGO URBANIZED AREA

A.   In the aggregate, the City of Chicago received more federal funds per capita than its suburbs.

Over the period 1989-1996 the federal government spent an average of $4590 (excluding loans and subsidized insurance) per capita in the Chicago Urbanized Area. These expenditures increased by about $420 (in 1996 constant dollars) from the first half to the second half of the period. As has been noted for several other metropolitan areas (Parker, 1995, 1997), per capita federal expenditures in the central city of Chicago were consistently higher than those in the city's suburbs (Figure 1 and Map 2). Moreover, this difference increased in real terms between the two periods, 1989-1992 and 1993-1996.

Figure 1: Per Capita Average Annual Federal Expenditures in the Chicago Urbanized Area, 1989-1996
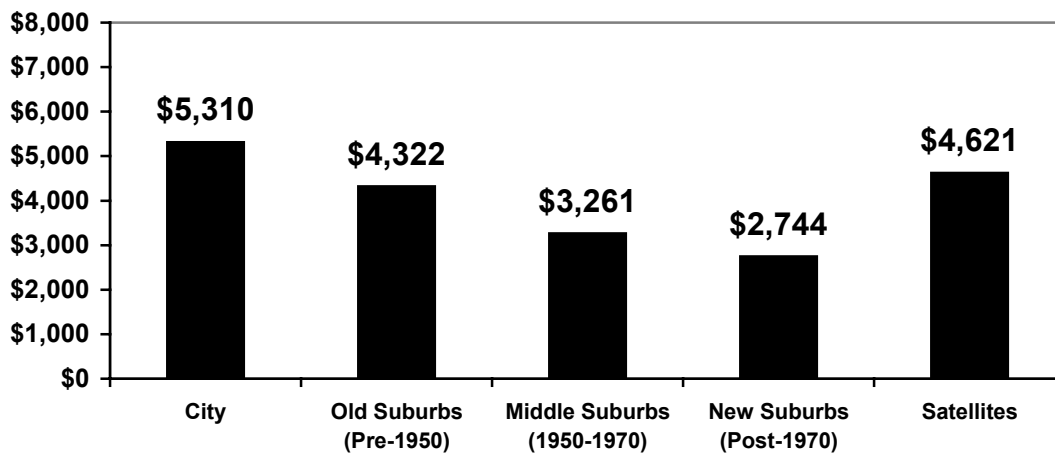
Federal expenditures per capita are higher in the central city and fall at a fairly steady pace from city to urbanized edge. Only in the older satellites does the per capita figure rise again. These data seem to support the notion that new suburbs receive relatively little direct support from the federal fisc. However, such a conclusion would be misleading. To understand the fine geography of federal spending we must consider the programmatic composition of these figures.

B.   While the City of Chicago received the bulk of the poverty-relieving programs, the wealth-building programs are strongly pro-suburban.

Table 4 presents a summary of our data by ring and major program area for 1989-1992 and 1993-1996. The two tables are quite similar. On the surface it is easy to see support for the possibility that the federal government in the George Bush administration was engaged in a "stealth"

urban policy (Parker, 1997), substituting transfers and medical payments for direct grants to city governments. The point seems particularly telling with respect to the comparison of the city proper and the newest suburbs on the periphery. Total federal expenditures per capita in the central city were about 66 percent higher than in the newer suburbs, those which joined the urbanized area between 1970 and 1990.

Table 4: Average Annual Per Capita Federal Expenditures: 1989-1992 and 1993-1996

1989 – 1992		City	Pre - 1950	1950 -1970	Post-1970	Satellites
a	Spatially Related Programs - Cost Reducing	267	631	642	656	340
b	Spatially Related Programs - Poverty Relieving	370	76	53	92	144
c	Non-Spatial Redistribution	1229	290	192	194	371
d	Retirement	2118	2379	1281	1171	1679
e	Salaries And Procurement	842	689	957	579	2045
f	All Other	111	86	47	15	39
	Total	4936	4151	3172	2708	4618
1993 – 1996		**City**	**Pre - 1950**	**1950 -1970**	**Post-1970**	**Satellites**
a	Spatially Related Programs - Cost Reducing	259	649	649	650	375
b	Spatially Related Programs - Poverty Relieving	447	65	42	96	166
c	Non-Spatial Redistribution	1696	384	266	263	487
d	Retirement	2348	2655	1409	1276	1776
e	Salaries And Procurement	791	658	931	462	1765
f	All Other	142	82	52	33	56
	Total	5684	4493	3350	2779	4624
	(All figures in 1996 dollars)					

But this "stealth policy" fails to extend to wealth-building programs. The bulk of the difference between expenditures at the core and periphery result from substantial differences in per capita expenditures on the two largest program areas, direct redistribution and retirement, programs that support the old and the poor. The "advantage" of the central city and virtually all the advantage of the oldest suburbs are attributable to the concentration in those locations of transfer expenditures for income support. As noted above, such expenditures do little to encourage wealth building.

The spatial distribution of federal salaries and procurement are disproportionately concentrated in the satellite towns, largely because of the military installations located there and the Fermi National Accelerator Laboratory. The newest mostly residential suburbs receive fairly little of these kinds of funds. These expenditures undoubtedly contribute to the general economic activity of

the municipalities that house them. The "other" group, consists mostly of grant expenditures and favors the city, with its concentration of universities, but accounts for relatively few dollars.

The spatially-related poverty relieving programs are similar to transfer programs and these favor the city proper. These expenditures are again driven by concern for low-income populations, and those populations have been historically concentrated in the city. As suggested above, some capital is accumulated as the result of these dollars spent on low-income housing and related programs. But that capital remains highly focused on serving the needs of the poor and may inhibit private investment for other purposes.

The spatially-related cost-reducing programs demonstrate a pattern quite different from those of all the other categories. In particular, these spatially related expenditures are strongly pro-suburban. Within the suburban groupings, federal expenditures per capita are evenly distributed. We find both old and new suburbs showing per capita federal expenditures far more than twice those of the central city. Somewhat surprisingly, the inner suburbs here do almost as well as those joining the urbanized area since 1970. However, the older satellites are much closer to the central city in per capita expenditures.

In the next subsection, we dig deeper into the most important wealth-building category to investigate what is behind the strongly pro-suburban nature of these federal programs.

C.   When comparing wealth-creating spending, the central city outpaced other areas in transit and other infrastructure spending, while the suburbs benefited overwhelmingly from the homeownership tax subsidy.

By considering the programmatic composition of this category, we can isolate the origins of this strongly pro-suburban federal spending pattern. Table 5 gives a more detailed breakdown of the spatially related programs that reduce costs in the suburbs.

Table 5: Average Annual Per Capita Federal Expenditures:
Spatially Related Programs – Cost Reducing, 1989-1992 and 1993-1996

1989 – 1992	City	Pre - 1950	1950 -1970	Post-1970	Satellites
Highways and Related	22	50	60	92	44
Public Transit	73	37	26	20	16
Other Infrastructure	36	5	2	0	1
Income Tax Subsidy for Housing	125	536	554	538	275
Environment and Disaster	2	2	1	7	4
Crime	8	0	0	0	0
Total	267	631	642	656	340

1993 – 1996	City	Pre - 1950	1950 -1970	Post-1970	Satellites
Highways and Related	25	55	65	80	54
Public Transit	70	35	22	16	14
Other Infrastructure	11	2	0	0	0
Income Tax Subsidy for Housing	125	556	560	552	301
Environment and Disaster	6	1	1	2	4
Crime	21	0	0	0	1
Total	259	649	649	650	375

As the data suggest, the federal government's role in providing infrastructure (other than for transportation), environmental assistance and anti-crime expenditures accounts for relatively modest sums on a per capita basis. Even more surprising, is the relatively small contribution of highway and related programs to the overall total. Even in the new suburbs of the urban periphery we estimate that only about $85 per capita was spent annually on this subcategory, and in the city the figure falls to about $25 per capita.

Two observations should be made in connection with these statistics:

- First, we have tried hard to ascribe to households in each municipality their share of highway expenditures based on use of the highway expenditures made over this period. This means that a town's allocation of highway expenditures doesn't depend on how many highway dollars were actually spent within its borders, but rather on the journey-to-work miles its commuters made over highways constructed, improved or maintained with federal funds in each county.[3]

- Second, these estimates relate only to expenditures actually made in the eight-year period. The Chicago area has not had significant highway construction since the early 1970s. Much of the expressway system originally planned for the area was never actually built. Still, there is a sense in which current commuters and other highway users are benefiting from previous capital expenditures. One could make a case for considering the ongoing flow of services

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[3] We use commuting miles because traditionally the capacity of a highway system is only seriously challenged during peak use. For more details on our modeling see the Appendix.

from earlier investments. However, the policies and programs that put the existing expressways in place are long gone. To give a clear picture of policy today we had little choice but to put aside these early expenditures and focus only on current dollar flows.

By far the most significant program area is the federal income tax subsidy of owner-occupied housing. While the return on almost all other investments must be declared as income and taxed, home owners are in effect allowed to underreport their non-earned income.[4] In the suburbs, these housing related tax expenditures per capita are much larger than in the city. A suburban family of four receives about $2200 a year while a city family of four receives about $500. The difference comes about for three reasons: higher home ownership rates in the suburbs, higher incomes in the suburbs, and higher housing values in the suburbs. Between the three rings of suburban municipalities, we find no significant differences, although more detailed data by individual municipalities show considerable variation related to income levels (see Map 3). The richest third of municipalities have an average subsidy of almost $4000 per family of four.

To measure the tax expenditure involved in leaving these imputed incomes untaxed, we need to estimate two critical parameters: the rate of return on housing capital and the applicable income tax rate. As to the first we make the very conservative assumption that in all communities housing capital pays a real rate of return of 5 percent per year. We put aside here issues of capital gains and inflation and in effect treat housing as an asset held in perpetuity. This 5 percent rate is applied to owner-occupied housing as reported in the 1990 census. Marginal tax rates were computed separately for each housing value category in each community.

It might be objected that the housing tax subsidy does not really affect locational costs. For any given household owning a unit of a specific value, the same housing tax subsidy applies throughout the urbanized area. However, such a conclusion fails to take into account supply differences at the periphery and the center. At the edge of the urbanized area, land supply is bountiful and subsidies reduce real costs of acquisition. At the center of the city, subsidies are far more likely to be capitalized into housing prices, and hence new home buyers gain little real benefit.

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[4] These estimates start from the longstanding tenet in public finance that various types of investment income should be treated similarly for tax purposes and, in particular, that implicit income from owner-occupied homes rightly should be taxed. From this point of view, mortgage deductions are perfectly appropriate as a cost of engaging in a "home" business, as long as the net income generated by that business is fully taxed (Musgrave and Musgrave, 1980, p. 359-361) Because of problems in implementation, taxation of imputed earnings from investments in owner-occupied dwelling has not been common among the countries of the world. However, both the Netherlands and Canada have actually implemented such taxation policies. We also note that the dollar figures we come up with using this method are quite similar to the federal tax subsidy implicit in deductibility of mortgage interest (Gyourko, 2001). Finally, we do not estimate the value of the property tax deduction on personal federal income taxes, since we are treating housing as a business investment, and such a deduction would be appropriate before taxing business income as profits. Through the Public Use Microdata Sample of the 1990 Census we estimate for each housing value category in a municipality the income distribution of owning households in that category. For more details see the Appendix.

From this perspective the estimates in Table 5 overstate the potential investment cost subsidy and hence the incentive effects of the subsidy in the city and, for that matter, in the older suburbs.

As noted above, all the other program categories included in the group can be viewed as reducing the local tax prices of public goods complementary to residential investment. Federal dollars allow local governments to reduce their tax rates and hence to reduce the effective price of home ownership. In the Chicago region, annual federal subsidies for highways and public transit come to about $100 per capita.5 These rather modest expenditures are surprisingly uniform across the area. The pro-periphery highway spending is just about equaled by the pro-city public transit expenditures. The city does much better than the rest of the urbanized area because city residents make extensive use of the Chicago Transportation Authority. It is likely, however, that these are not completely comparable investments as there are disparate impacts of highway versus transit spending – particularly in terms of impact on land development and economic activity.

Other infrastructure expenditures do favor the city, but are quite small. Again, these expenditures are included here because they reduce local public costs and hence the effective price of residential location. The two remaining subcategories are environmental spending and crime prevention subsidies. Like infrastructure subsidies, both of these substitute for local public costs. For this period, neither is very large.

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[5] Two observations should be made in connection with the highway estimates. First, we have tried hard to ascribe to households in each municipality their share based on highway commuting use. Thus a highway expenditure in a particular locale is not allocated completely to the residents of that locale, but rather is divided among all municipalities in proportion to their commuting use of that highway. In particular, this means that suburban commuters are credited with a portion of highway expenditures in the city of Chicago. A similar methodology was applied to public transit.

IV. SUMMARY

Federal expenditures on programs that affect the cost of residential investment in the city of Chicago and its suburban rings, strongly favor the suburbs, and most strongly favor the periphery where the elasticity of housing supply is greatest. This conclusion is based largely on the impact of the income tax treatment of housing. At the periphery, the high elasticity of housing supply turns the structure of federal income taxes into a massive housing program, the equivalent of a blank check for residential investment. To a more limited extent, federal spending has encouraged wealth-building in the city. But these federal funds have been highly focused on housing programs and infrastructure specialized in meeting the needs of the poor. Together these observations implicate federal policy in the decentralization of population and the concentration of urban poverty that have characterized the recent history of the Chicago metropolitan area.

The welfare implications of our results depend heavily on the extent to which decentralization and poverty concentration generate net costs for the metropolitan area. Of course, these questions are themselves major subjects of debate. We read the considerable research literature as suggesting that the pace of decentralization in recent years has had highly unattractive distributional impacts with no positive effect on overall efficiency. (Persky and Wiewel, 2000).   Under this interpretation, the data presented here support a major reconsideration of the income tax treatment of owner occupied housing.

At the very least, our results suggest the usefulness of viewing federal expenditures in terms of their influence on wealth building across the metropolitan area. Hence, we argue for an extensive revision of federal statistics along the lines of the present study. Small area data on the character and federal spending can play a significant role in encouraging accountability and facilitating debate.

Appendix

A. Places and Their Categorization

This paper is based on the disaggregation of federal funds at municipality or town levels. Once the federal programs are disaggregated at this level, then they are aggregated back to the following groups of places based on when those places entered the urbanized area, as defined by the Census Bureau:

- Chicago proper
- Pre-1950: Older Suburbs included in the urbanized area by 1950
- 1950-1970: Middle Suburbs added to the urbanized area between 1950 and 1970
- Post 1970: New Suburbs added to the urbanized area between 1970 and 1990
- Satellites: Satellite communities

The component municipalities of each of the groups are given in Table A1.

Municipalities are ranked within each group in terms of estimated 1993-1996 per capita federal expenditures. Thus they include estimates of income tax subsidies for housing and earned income tax credits. In addition, highway and public transit expenditures are distributed on a use basis as opposed to a "where spent" system.

The several outliers are accounted for by concentrations of federal procurement expenditures in the metropolitan area. Federal payroll also has a high variance across municipalities. Among major program areas housing and community development, Medicaid and low income housing also have large coefficients of variation.

Table A1: Geographic Groupings of Municipalities with Average Annual Per Capita Federal Expenditures 1993-1996

I. City					
CHICAGO	5684				

2. Pre 1950: Older Suburbs	4493				
NORTH RIVERSIDE	7065	CHICAGO HEIGHTS	5102	CLARENDON HILLS	4284
FORD HEIGHTS	6674	WILMETTE	5054	MELROSE PARK	4268
ROBBINS	6404	OAK LAWN	5009	LAKE BLUFF	4256
LINCOLNWOOD	6092	WESTERN SPRINGS	4939	OAK PARK	4241
NORRIDGE	6045	MARKHAM	4889	BURNHAM	4049
MAYWOOD	6040	DOLTON	4783	WESTMONT	4036
PHOENIX	6001	NORTHBROOK	4764	LANSING	4007
WESTCHESTER	5997	FLOSSMOOR	4753	BURBANK	3939
DIXMOOR	5996	HIGHLAND PARK	4736	GLENWOOD	3913

GLENVIEW	5821	HILLSIDE	4710	GLEN ELLYN	3872
NORTHFIELD	5808	SO CHICAGO HTS.	4674	BRIDGEVIEW	3857
RIVERDALE	5700	SOUTH HOLLAND	4655	LOMBARD	3808
RIVER GROVE	5694	FRANKLIN PARK	4648	ARLINGTON HEIGHTS	3800
EVANSTON	5645	HINSDALE	4637	MOUNT PROSPECT	3743
MERRIONETTE PARK	5594	KENILWORTH	4604	PARK FOREST	3731
HARWOOD HEIGHTS	5475	STICKNEY	4586	WORTH	3728
EVERGREEN PARK	5428	CICERO	4522	BENSENVILLE	3618
HARVEY	5425	EAST HAZEL CREST	4507	ITASCA	3589
HIGHWOOD	5423	BROOKFIELD	4507	VILLA PARK	3564
PARK RIDGE	5420	POSEN	4486	MATTESON	3561
NILES	5363	BELLWOOD	4472	ALSIP	3469
GLENCOE	5347	FOREST PARK	4457	WHEATON	3454
LAGRANGE PARK	5340	THORNTON	4408	MIDLOTHIAN	3341
CALUMET PARK	5333	NORTHLAKE	4394	SCHILLER PARK	3286
SKOKIE	5301	DOWNERS GROVE	4385	WOOD DALE	3250
RIVER FOREST	5288	LYONS	4375	TINLEY PARK	3222
ELMWOOD PARK	5284	LAKE FOREST	4332	SOUTH BARRINGTON	3158
BERKELEY	5282	SUMMIT	4331	PALATINE	3155
BERWYN	5268	DES PLAINES	4325	CRETE	3095
MORTON GROVE	5208	BLUE ISLAND	4316	WHEELING	2979
WINNETKA	5162	LAGRANGE	4313	OAK FOREST	2802
CALUMET CITY	5160	HOMEWOOD	4306	STONE PARK	2774
DEERFIELD	5128	ELMHURST	4294	STEGER	2716
HOMETOWN	5123	HAZEL CREST	4294	ADDISON	2708

III. 1950-1970 Middle Suburbs	3350				
ROLLING MEADOWS	13143	RIVERWOODS	3747	WINFIELD	2941
OAK BROOK	7821	PALOS PARK	3715	PROSPECT HEIGHTS	2850
OAKBROOK TERRACE	5599	WILLOWBROOK	3559	CAROL STREAM	2761
BURR RIDGE	5293	GURNEE	3542	BARTLETT	2717
BARRINGTON	5186	COUNTRY CLUB HILLS	3447	SCHAUMBURG	2714
ELK GROVE VILLAGE	4877	DARIEN	3417	WARRENVILLE	2705
LINCOLNSHIRE	4847	ORLAND PARK	3396	BUFFALO GROVE	2681
ROSEMONT	4610	JUSTICE	3372	NAPERVILLE	2608
INVERNESS	4557	WEST CHICAGO	3351	WOODRIDGE	2540
ZION	4472	CRESTWOOD	3297	SAUK VILLAGE	2503
PALOS HEIGHTS	4355	RICHTON PARK	3277	ROSELLE	2489
INDIAN HEAD PARK	4287	CHICAGO RIDGE	3223	STREAMWOOD	2457
HODGKINS	4261	BANNOCKBURN	3147	LISLE	2416
OLYMPIA FIELDS	4222	WILLOW SPRINGS	3143	GLENDALE HEIGHTS	2280
COUNTRYSIDE	4176	WINTHROP HARBOR	3088	HOFFMAN ESTATES	2155
PARK CITY	3979	HICKORY HILLS	3042	HANOVER PARK	2108
PALOS HILLS	3801	BLOOMINGDALE	3006		

IV. Post-1970: New Suburbs	2779				
LAKE VILLA	4196	MCHENRY	3068	HAWTHORN WOODS	2667
FOX LAKE	4181	LONG GROVE	3062	VERNON HILLS	2607
GRAYSLAKE	4168	MUNDELEIN	3020	LYNWOOD	2597
ANTIOCH	4001	LAKEWOOD	2805	LAKEMOOR	2584
LAKE BARRINGTON	3830	MCCULLOM LAKE	2772	FRANKFORT	2523
LIBERTYVILLE	3694	ROUND LAKE PARK	2772	ORLAND HILLS	2516
ROUND LAKE	3617	TOWER LAKES	2762	CRYSTAL LAKE	2478
BEACH PARK	3602	UNIVERSITY PARK	2753	CARY	2462
NORTH BARRINGTON	3580	FOX RIVER GROVE	2736	ALGONQUIN	2176
GREEN OAKS	3380	LAKE ZURICH	2724	LAKE IN THE HILLS	1953
KILDEER	3249	LINDENHURST	2705	BOLINGBROOK	1783
ROUND LAKE HEIGHTS	3224	MCHENRY	3068	OAKWOOD HILLS	1675
DEER PARK	3191	ROUND LAKE BEACH	2668		

V. Satellites	4624				
BATAVIA	16233	EAST DUNDEE	3323	SLEEPY HOLLOW	2657
NORTH CHICAGO	15490	ELGIN	3232	NEW LENOX	2507
WAUKEGAN	4979	MONTGOMERY(in Kane)	3228	SOUTH ELGIN	2317
JOLIET	3685	GENEVA	3219	CREST HILL	2196
LOCKPORT	3584	SAINT CHARLES	3066	ROMEOVILLE	2023
NORTH AURORA	3352	PLAINFIELD	2999	SHOREWOOD	1958
ROCKDALE	3333	CARPENTERSVILLE	2755	GILBERTS	1914
AURORA	3324	WEST DUNDEE	2729		

Eight towns were excluded from the study because of a lack of federal or other data. These are listed below in Table A-2.

Table A2: Towns Excluded for Missing Data

BEDFORD PARK
BROADVIEW
FOREST VIEW
GOLF
HAINESVILLE
INDIAN CREEK
MCCOOK
RIVERSIDE

Of these only Broadview (pop. 8538) and Riverside (pop. 8774) had a population greater than 1000 in 1990.

B.   Programs

To be consistent over the years, we have used program codes, program names and object codes for re-grouping. Although program codes are useful for this grouping process, they are not consistent over the years. For instance, the program codes for social security and retirement programs changed substantially over the years. In addition to program codes, program names also change over the years. As a result, by using program names, codes and object codes we assign every federal program to one of the sub-groups for each year in the 1989 to 1996 period. As this description suggests, a considerable amount of judgment is necessarily involved in the assignment process.

We have attempted to assign all programs to an appropriate category. Loan and insurance programs (but not insurance payments) are excluded from the study because of the difficulty of determining the dollar value of such activities to recipients. Moreover, as suggested in the text, the largest loan programs are now largely self-financing.

C.   Distributing Undistributed Data

The CFFR data sets report federal programs distributed at five levels:

- Distributed at town level
- Distributed at township level
- Distributed at county level (county undistributed)
- Distributed at state level (state undistributed)
- Balance of county

As suggested in the main text, we first collected all data available at the town level. The relatively small amounts of federal funds distributed at the township level are excluded from this study. Similarly, the modest "balance of county" figures are also excluded since the municipalities affected cannot be identified.

The major challenge in determining municipality level federal expenditures is the allocation of undistributed county level expenditures. Many of these programs are direct transfers. Often the county level figures themselves have been estimated rather than built from underlying micro data.

To allocate these county level expenditures to the town or municipality levels, we make the key assumption that dollars will be distributed *within* a county much as they are distributed *among* counties. Thus for each program we begin by estimating regression equations on a data set made up of all the counties of Illinois. In each case the dependent variable is the per capita county-wide federal expenditure for that program, in 1996 dollars. Separate regressions are run for each four year period, 1989-1992 and 1993-1996. Independent variables, primarily taken from the 1990 U.S. Census, vary as appropriate to the subject matter. The resulting equations are presented in Tables A3 and A4. The definitions of dependent and independent variables are given following the tables.

We then use the estimated regression coefficients, now combined with independent variables at the municipality level, to estimate per capita federal expenditures at the municipality level. Finally within each of the six counties of the metropolitan area we normalize municipality estimates to match each county total.

Table A3: County Regressions, 1989-1992

Dependent Variables	A	b	c	d	Adj. R²
AGTOT	-16.2	1.1*farminc			0.74
FOOD STAMPS	-49.5	4.8*fem	5.2*pov		0.81
SOCSEC	160.8	0.9*ssinc	25.3*G64yrs		0.82
L.I.H.A.	-0.1	-0.2*pov	0.5*fem		0.04
FEDRET	-0.9	7.7*G64yrs	12984*civshare		0.74
OTHRET	-11.9	5.8*g64yrs			0.06
MEDICARE	-58.1	13.0*ss	0.3*ssinc		0.58
VETRETS	-47.9	3.8*vets	2.6*G64yrs	2.9*pov	0.66
REDISTGR	-123	4.5*schoolage	1.6*pov	4.4*fem	0.86
MEDICAID	-412	18.7*pov	37.4*L6yrs		0.73
SUPSEC	-130	6.2*pov	12.1*L6yrs		0.71
REDISTVET	0.0	20.6*milshare	0.0*pov		0.22
EDDEP	-4.1	3*schoolage	1.5*pov	0.8*fem	0.68
DIS	4.2	0.1*farminc			0.26
POPPROC	13.96	208.7*ag	63.2*service	99*pa	0.22
MILWAGES	-72.5	26158*milshar			0.94
CIVWAGES	37.9	32408*civshare			0.94

Table A4: County Regressions, 1993-1996

Dependent Variables	a	b	c	d	Adj. R²
AGTOT	-18.0	1.1*farminc			0.71
FOOD STAMPS	-49.3	5.5*fem	4.6*pov		0.83
SOCSEC	198	1.0*ssinc	27.4*G64yrs		0.80
L.I.H.A.	1.19	-0.2*pov	0.5*fem		0.02
FEDRET	-83.2	7.2*G64yrs	13897*civshare		0.73
OTHRET	-5.5	4.9*g64yrs			0.06
MEDICARE	-119.6	16.4*ss	0.4*ssinc		0.67
VETRETS	-38.6	3.6*vets	1.7*G64yrs	3.05*pov	0.64
REDISTGR	-157.6	5.8*schoolage	2.4*pov	5.01*fem	0.86
MEDICAID	-726	32.5*pov	65.3*L6yrs		0.74
SUPSEC	-214	9.1*pov	20.5*L6yrs		0.67
REDISTVET	0.91	74.6*milshare	0.75*pov		0.35
EDDEP	-57.7	2.5*schoolage	1.9*pov	0.7*fem	0.83
DIS	16.9	0.0*farminc			0.0
POPPROC	13.0	282*ag	104*service	116*pa	0.29
MILWAGES	-59.7	21519*milshar			0.75
CIVWAGES	66.3	26977*civshare			0.91

Dependent Variables:

AGTOT: Total all agricultural programs.
FOOD STAMPS: Food Stamps program
SOCSEC: Social Security
L.I.H.A.: Lower Income Housing Assistance Programs
FEDRET: Retirement Payments to Federal Employees
OTHRET: Retirement Payments to Non-Federal Employees
MEDICARE: Payments to Medicare Recipients
VETRETS: Retirement Payments to Veterans
REDISTGR: Redistributional Federal Programs
MEDICAID: Federal Programs for Medicaid Recipients
SUPSEC: Supplementary Security Income
REDISTVET: Payments to Veterans- poverty related
EDDEP: Programs for Educationally Deprived Children
DIS: Disaster Related Federal Programs
POPPROC: Post Office Procurement
MILWAGES: Salary Payments to Active Military Workers
CIVWAGES: Salary Payments to Civilian Workers.

Independent Variables:

SS: Percent of Household Receiving Social Security Income
SSINC: Per Capita Social Security Income
FARMINC: Per Capita Farm Income
FEM: Percent of Household Headed by Female
VETS: Percent of Veterans in Population, Male Veterans only
POV: Percent of Population Below Poverty
L6YRS: Percent of Population Younger than 6 Years Old
G64YRS: Percent of Population Older than 64 Years Old
SCHOOLAGE: Percent of Population in School Age
MILRES: Residents Work for Military, in Absolute Numbers
FEDRES: Residents Work for Federal Government, in Absolute Numbers
CIVSHARE: Per Capita Federal Residents
AG: Per Capita Total Employment in Agriculture
SERVICE: Per Capita Service Sector Employment
TRADE: Per Capita Trade Sector Employment
MILSHARE: Residents Work for Military, Per Capita
PA: Per Capita Public Administration Employment
PUBCAS: Percent of Household Receiving Public Assistance
PUBASINC: Per Capita Public Assistance Income

Most of the equations perform reasonably well and are consistent over the two periods. For disaster assistance we simply assigned each community its county average. For low income housing assistance, the regressions relate only to those specific programs that were undistributed. However the largest part of this general category was already distributed across municipalities in the detailed CFFR data.

A relatively small group of programs are not allocated by the CFFR below the state level. The largest of these by far is unemployment compensation. Some elements of the medical assistance program also fall into this category, but the bulk of the program was allocated by the equations described in the last two tables. Table A5 gives a list of the relevant programs and the variable used in each case to allocate statewide expenditures to municipalities. For example a municipality in the study received a share of the state's Legal Assistance Funds in proportion to its share of the state's poverty population.

Table A5: Programs for Which CFFR Provides Only State Level Data

Program	Allocator Used
Federal Retirement and Disability Payments – Civilian	POPULATION>65
Federal Retirement and disability Payments – Coast Guard/Uniformed Employees	POPULATION>65
Special Supplemental Food Program for Woman, Infants and Children (WIC)	POVERTY
Medical Assistance Program	POVERTY
Unemployment Compensation Benefit Payments	UNEMPLOYMENT
Rent Supplements – Rental Housing for Lower Income Families	POVERTY
Low-Income Home Energy Assistance	POVERTY
Fair Housing Assistance Program – State and Local	POPULATION
Historic Preservation Grants-in-Aid	POPULATION
Job Training Partnership Act (JTPA)	POVERTY
Public Housing Drug Elimination Program	POVERTY
Schools and Roads – Grants to States	POPULATION
Highway Planning and Construction	POPULATION
State and Community Highway Safety	POPULATION
Alcohol Traffic Safety and Drunk Driving Prevention Incentive Grants	POPULATION
Interagency Hazardous Materials Public Sector Training and Planning Grants	POPULATION
Public Safety Officers' Death Benefits Program	POPULATION
Public Safety and Community Policing Grants	POPULATION
Federal Employee Life/Health Insurance Premium Payments – Employer Share	FEDERAL EMPLOYMENT
Corporation for Public Broadcasting – Grants	POPULATION
Handicapped – State Grants	POPULATION
Rehabilitation Services – Basic Support	POPULATION
Social Services Block Grant	POVERTY
Legal Services Corporation Payments	POVERTY
Federal Government Payments for Excess Earned Income Tax Credits	POVERTY

D. Other Program Estimates

1. *Highways*

As suggested in the text, highway expenditures are estimated on a use basis, since commuters (and other drivers as well) often cross jurisdictional boundaries. The data on expenditures again come from the CFFR. These are primarily at a county level. To determine municipality use of these expenditures, we constructed a simple origin-destination model. The number of 1990 morning auto commuting trips, t_{ij}, from each municipality i to each municipality j was taken from the Census Transportation Planning Package (1993). For example, the number of morning trips from Hinsdale to Chicago was 1151. For each such commute a straight line distance d_{ij}, was estimated using the central longitudes and latitudes of i and j. A commute was then divided into segments , m_{ijc}, lying totally within a county c. Thus for a given commuting path from i to j,

$$d_{ij} = \Sigma_c\, m_{ijc}.$$

Each residential community i was then assigned a portion of county c's highway expenditures (E_c) equal to

$$\Sigma_j\, [t_{ij}\, m_{ijc}/\, \Sigma_i\Sigma_j\, t_{ij}\, m_{ijc}] * E_c .$$

Summing these for a given i over all counties c provides the estimate of total highway expenditure undertaken on behalf of the residents of that municipality.

2. *Public Transit*

In allocating federal public transit funds we begin with estimates of ridership shares constructed by Joe DiJohn of UIC's Urban Transportation Center. For each major public transit program, the CTA, PACE, and METRA, DiJohn used official reports to divide ridership among the five geographic components of our study and the small remainder in the metropolitan area. (See Table A6.)

Table A6: Residential Distribution of Public Transit Ridership by Program

AGENCY	Chicago	1950 Suburbs	1970 Suburbs	1990 Suburbs	Satellites	Remainder
CTA	0.932	0.064	0.004			
METRA	0.175	0.515	0.181	0.059	0.051	0.019
PACE	0.027	0.651	0.149	0.009	0.146	0.018

The federal funding for each program was then divided in the same proportions as ridership. Notice this approach does not allow us to estimate the variation in public transit subsidies across municipalities within groupings.

3. *Earned Income Tax Credits*

The Internal Revenue Service makes public data on the share of adjusted gross income for each income class the amount of earned income tax credits recognized. Taking this figure as a

percentage of adjusted gross income gives us a rough estimate of the negative tax rate for the lower income groups. In 1996 these were about 8 percent for filers earning less than $15,000 and 1.3 percent for those earning between $15,000 and $30,000.   For the 1992-1996 period these rates were then applied to income distribution data for each municipality taken from the 1990 Census of Population. Income figures were adjusted to 1996 dollars. For the 1989-1992 estimates the earned income tax rates were adjusted down in line with the movement in total national credits.

4.   *Income Tax Subsidy for Housing*

The largest portion of the spatially sensitive federal subsidies comes from the income tax treatment of housing. Our approach here again relies on data from the 1990 census. For each community we obtained a distribution of housing values from the census. Households are assumed to earn a conservative 5 percent net income from their investment. The tax subsidy is then dependent on what tax rates would be charged against this income. For each range of housing values in a community we need to determine an average income tax rate, which depends on the average income of this group of householders. Unfortunately no cross tabulations of housing values by income are available at the municipality level. However, we were able to construct such a cross tabulation for the PUMA areas of the Public Use Microdata Sample (PUMS). For a municipality we simply use the table for the PUMA in which it is located.   Armed with the resulting average income figure for each housing value group in a community, we find the marginal income tax rate reported by the Internal Revenue Service.

For 1989-92, we used the Census housing values adjusted to 1996 dollars. For the 1993-1996 period, we adjusted these values for municipality specific rates of appreciation as reported by commercial real estate brokers.

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