FACULTY PAPER SERIES

**The Impact of the Young-old and the Old-old on a Small Rural Region:
An Application of the Wisconsin Economic
Impact Modeling System**

Faculty Paper 98 - 10A

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Abstract

The literature on the economic and fiscal impacts of in-migrating retirees on rural communities concentrates on the young, newly-retired. An issue not systematically addressed are the impacts on the communities as these retirees age. The Wisconsin Economic Impact Modeling System, a county level conjoined input-output/econometrics simulation model, is used to assess the impact of an aging rural population. Using data from the US Bureau of Labor Statistics' Consumer Expenditure Survey, profiles of two household types are constructed and used to simulate the economic impact of an additional 500 elderly households into a small rural economy. Household types vary by age and, as a result, have different income levels and expenditure patterns. As hypothesized, the magnitude and nature of impacts is in direct proportion to relative household size and income level.

Key words: aging, economic impacts, development policy

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Introduction

In 1920 less than 1 American in 20 was over the age of 65. By 1995 the proportion of Americans over 65 had risen to 1 in 8. It is estimated that 1 in 5 Americans will be over the age of 65 by 2030 (Smith, Willis and Weber). These changes in the population are of interest not only to demographers, but also to economists and development policy makers. As demonstrated by the baby boom, the age structure of the population greatly influences consumption patterns, which in turn ripple throughout the economy. The "graying of America" and its impact on the economy has been a topic of considerable discussion and research for over 20 years (Bigger).

 But the graying of the population is not a geographically uniform trend. A higher percentage of the rural, than of the urban, population is over the age of 65. In addition, the percentage of the population that is older has increased more rapidly in rural than in urban areas (Glasgow and Beale). The aging of rural America is the result of two trends: in-migration of younger and wealthier urban retirees to rural areas and out-migration of rural young adults to urban areas.

The impact of in-migrating retirees on rural communities has been well documented in the literature (e.g., Stallmann and Siegel). The research falls into three primary areas: 1) their decision processes concerning migration (Wiseman: Wiseman and Roseman; and Cuba (1991 and 1989)); 2) their impacts on social aspects of the community (Glasgow, Green et.al.; Kelsey, Smith and Luloff); and 3) their economic and fiscal impacts on the receiving communities (Deller; 1995; Deller and Walzer; Sastry; Siegel and Leuthold; Barkley and Henry; Miller; Happel, Hogan and Sullivan; Happel, Hogan and Plantz; Mullins and Rosentraub; and Joseph and Cloutier).

The preponderance of the research tends to find positive economic impacts on the receiving communities from in-migrating elderly. Over the past twenty years counties identified

as retirement destination regions by the USDA ERS, have experienced above average population and employment growth and rapid income growth (Cook and Hady; Walzer and Deller; Reeder and Glasgow).[1] This pattern has continued. From 1992 to 1995 per capita income in retirement counties increased twice as much as any other type of rural county ("Migration Contributes..."). As a result of this research, the recruitment of retirees has become a popular rural development strategy. Because of the coming surge in the number of retiring baby boomers the attraction of retirees seems an even more promising strategy. As such both individual communities and several states have begun development programs to attract retirees (Reeder, Hopper and Thompson; Fagan and Longino).

But prior to the retirement of the "boomers" the distribution of the aged will look very different than from today. The expected rate of growth in persons over 65 is only about 1.2 percent annually from 1988 to 2010 and (U.S. Bureau of the Census). During that time the actual growth in the number of those in their retirement years will be in the numbers of persons over age 70. This is because the numbers of persons in their 60s will actually decline through the 1990s (Exter). In short, the bubble of young wealthy retirees that are being pursued by so many communities will enter a lull for several years. The aging of retirees is the newest retirement phenomena.

What the research does not systematically address is the impact on communities as retirees age. The concern that the positive economic and fiscal impacts of in-migrating retirees hide longer-run increased health care and human services costs has been called "the grey peril" (Longino, 1988). Longino points out that while the issue is often raised, "Nowhere is the direct impact of such migration on government expenditures estimated. Nor are there studies that compare the aggregate or per capita impact of younger and older migrant households on different types of government expenditures..." (Longino, 1988, p.453).

The intent of this study is to systematically examine the economic and fiscal impacts of

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[1] Retirement destination counties are defined as non-metropolitan counties with a net in-migration of persons aged sixty and over of at least 15 percent (Bender et al.),

the aging of the retiree population using a holistic modeling approach, the Wisconsin Economic Impact Modeling System. Using data from the Bureau of Labor Statistics' Consumer Expenditure Survey we construct profiles of two elderly households: 65-75, the young-old, and over 75, the old-old. Then, within an experimental framework, 500 households of each type are introduced into a small rural economy in Wisconsin. Based on their expenditure patterns, the economic and fiscal impacts are estimated for each age group. This study provides information about the changing nature of the long-run impacts of as once young retirees begin to age.

The paper proceeds in the following manner. We provide a review of the literature on the economic and fiscal impacts of retirees and of the limited literature on the economic and fiscal impacts of increasingly aged populations. We then introduce and describe the Wisconsin Economic Impact Modeling System, which is used to frame the simulated aging scenario. We then describe the two scenarios and report on the estimated economic and fiscal impacts. The paper closes with an overview of findings and a discussion of implications for community decision-makers.

Available Impact Literature

Research quantifying economic impacts of retirees on communities has tended to concentrate on planned retirement communities (Siegel and Leuthold; Barkley and Henry; Miller), that is new communities developed specifically to appeal to retirees (Stallmann and Jones). There are a few studies that try to determine the economic impacts in other types of retirement communities, as defined by Stallmann and Jones. Henderson compared expenditures of independent-living and assisted-living retirees in an Ohio community of 5,000. Woods and Allen studied two counties in Oklahoma with a high percentage of retirees in assisted care facilities. Rowles and Watkins studied two resource amenity communities and an old-home-town retirement community. Jones, Whitehorn and Wyse studied three small regional retirement center communities in East Texas that attract retirees from within the state.

Most studies consider only economic impacts. Some earlier studies were even more limited, and estimated only direct economic impacts (Happel, Hogan and Sullivan; Happel,

Hogan and Plantz). More recent studies consider the standard multiplier effects and estimate direct, indirect and induced impacts. Still, many of these studies are based on relatively newer communities (Siegel and Leuthold; Barkley and Henry).

Finally, only one study compares the economic impacts of in-migrating retirees to the impact of an alternative--that is looking at the opportunity costs to the community of pursuing one option versus another. Sastry compared the impacts on the Florida economy of elderly in-migrants and an "exogenous increase in non-elderly income that yields an identical increase in total final demand (p.55)." Contrary to common perceptions, the elderly spent more of their income in sectors with higher-than-average earnings than did the non-elderly (e.g., the health care sector). The consumption pattern of the elderly resulted in higher indirect and induced effects and higher total impacts on earnings and employment.

While the economic impact of elderly migration appears to be well understood (Sastry; Deller, 1995; Stallmann and Siegel), the fiscal impact on local governments is not as clearly documented. Research has often stopped at quantifying economic (jobs and income) impacts and has not quantified fiscal impacts (Voth, Miller and Cluck; Miller, Voth and Cluck). Fiscal impact analysis is important because, even among new, planned retirement communities, there is wide variation in what is provided by local government and what is provided by the homeowners' association (Siegel and Leuthold; Barkley and Henry). In addition, new communities of retirees may over time attempt to shift some services from the association to the local government (Siegel, Leuthold and Stallmann), or they may begin to demand new services specifically aimed at retirees (Longino; Rowles and Watkins).

While a number of fiscal impact studies are available in the literature, wide variations in methodological approaches makes it difficult to generalize results. Historically, fiscal impact assessment has followed a number of methods such as the per capita multiplier method to case study analysis to the service standard method (Burchnell and Listokin). Many of these more traditional approaches can be viewed as "partial analysis" because the complex dynamics of the

local economy are not explicitly captured. Some studies report only the additional tax revenues generated by the in-migrating retirees and do not include public expenditures necessitated by the in-migrants (Jones, Whitehorn and Wyse). Other studies include the additional public costs caused by the in-migration, or the additional costs of services to the new community (Barkley and Henry), or they estimate the increased public costs based on local per capita expenditures and multiply by the number of in-migrating retirees (Miller). The increased tax revenues paid by the retirees are subtracted from the estimated costs of the retirees to determine the fiscal impact.

A study in Pennsylvania found that preferential tax treatment of the elderly resulted in low fiscal benefits for local communities (Kelsey, Smith and Luloff). That same study also found that elderly do actively attempt to influence local taxes and expenditures. Siegel and Leuthold found that elderly in-migrants to a Tennessee community provided positive fiscal benefits, but were attempting to shift more costs to the public sector, which would lower their fiscal benefit to the community. The same study found that the indirect local jobs created by elderly consumption had a negative fiscal impact on the community because of the costs of educating the children of the people who fill those jobs.

But, as noted by Halstead and Johnson and Swallow and Johnson, earlier attempts within the fiscal impact literature to develop "holistic" models are incomplete because they are often very "rudimentary" in terms of modeling approaches, empirical estimation methodologies or, more fundamentally, simplistic economic theoretical foundations. Two studies provide holistic fiscal impact analyses that directly tie the fiscal analysis to the economic impact analysis. Siegel and Leuthold estimate the economic and fiscal impacts on the county of a planned retirement community in Tennessee. Because of the multiplier effect, additional jobs and additional in-migration are caused. This leads to fiscal impacts not only by the retirees, but also by the multiplier effect that they create. This study finds positive fiscal impacts directly from the retirees, negative fiscal impacts from the indirect effects and an overall positive fiscal impact. This is a study of a new planned retirement community and the authors note that the community is already trying to shift some homeowner's costs to the public sector. Thus the fiscal impacts

are likely to be less positive in the future than those estimated by the study (Siegel, Leuthold and Stallmann).

Deller (1995) estimates the economic and fiscal impacts of retiree migration for the state of Maine. That study does not report the same level of positive fiscal impacts as suggested by the Tennessee study. Rather it suggests that demand for public services increases in proportion to the increase in population. Deller (1995) goes on to suggest that this difference may be because of the level of analysis–state versus county. A state-level analysis includes demand for state government services that would not be included in a local fiscal analysis.

In a study of local government expenditures in rural areas Reeder and Glasgow find that expenditures on infrastructure, such as roads and bridges, are 28 percent lower in retirement counties than in other rural counties, and expenditures on education were 6 percent less per pupil than the rural average. Surprisingly, they also found that local governments in retirement counties spend 11 percent less on public health and hospitals.

In addition, mature retirement counties, those with one-sixth or more of the population over 65, performed better economically and were more stable than other retirement counties. Because of their high concentrations of elderly, these counties are likely to contain a higher percentage of the old-old. Mature retirement counties spent slightly less on roads than did other retirement counties. Mature retirement counties spent three percent more than retirement counties on health, but still less than other rural counties. Local revenue effort was 5.3 percent in mature retirement counties, 5.6 percent in all retirement counties and 6.4 percent in rural counties (Reeder and Glasgow) .

The above literature, which focuses on the migration of younger and wealthier retirees, points to the positive impacts these retirees can bring to a community. There are few studies, however, that address the economic and fiscal impacts of the aging of the elderly, and the impacts are generally not estimated in a systematic matter. The literature that addresses the aging of the elderly tends to focus specifically on housing and healthcare needs. This focus is

not surprising given the documented increase in health and daily-living needs of the elderly as they age. While living conditions of rural and urban elderly are roughly comparable, the major differences are in income and health (Glasgow and Beale).

Poverty tends to increase with age, as the elderly exhaust their assets. In 1996, 25 percent of the non-metropolitan population aged 60-74 were poor or near poor, compared with 19 percent in metropolitan areas. At the same time, 42 percent of persons over 75 in non-metropolitan areas were poor or near-poor, compared with 28 percent in metropolitan areas ("Nonmetro Elders..."). In addition, a higher percentage of the rural population are among the old-old. Six percent of the non-metropolitan population was over 75 in 1996, compared with 5 percent in metropolitan areas ("Nonmetro Elders...").

Not only income, but also health, declines with age, and, consequently, the use of medical services increases. In 1984, health expenditures were 8.4 percent of total expenditures for those 65-74, and 13.3 percent for those 75 and older. Those over 75 are more likely to have seen a doctor during the year than those 60-74 years old. The rate of hospitalization increases more rapidly for those over 75 than does the use of doctors. While urban elderly see doctors more often, the rural elderly are more likely to be hospitalized (Rogers). Lack of a full range of medical services in rural areas may increase in-patient care (Glasgow and Beale).

In addition, a higher percentage of rural hospital patients are publicly supported. For rural hospitals, nearly 39 percent of net patient revenue was from Medicare, compared with 34 percent for urban hospitals (Frenzen). As a result, rural hospitals face higher uncompensated costs than do urban hospitals (Nelson and Salmon). In 1994 losses from Medicare patients were 3.7 percent of total costs for rural hospitals, 2.5 percent for urban hospitals. As a result, rural hospitals engage in more cost shifting to private patients than do urban hospitals (Frenzen).

Because of higher poverty rates in rural areas, Medicaid covers 13 percent of non-institutionalized, non-metropolitan residents, compared with 12 percent in metropolitan areas. Medicaid provided 16 percent of revenues for rural physicians in 1993, compared with 11 percent in urban areas. Medicaid, however, is a lower percentage of net patient revenues in non-metropolitan hospitals than in metropolitan hospitals (Frenzen).

Haas and Crandall examined the impacts of elderly migrants on the health care systems in two counties, one in North Carolina and the other in Florida. In general the in-migration of retirees increased the health care services available in the county by increasing the number of physicians, increasing the number of medical specialists and upgrading facilities. Respondents did note that there were increasing difficulties in placing patients in nursing homes and voiced the fear that this may become more severe as the population ages.

Henderson, compared expenditure patterns of independent, and assisted-living retirees in a subdivision in Ohio. Although not stated, it is likely that the assisted-living retirees are older than those who live independently. While the two groups spent the same amount weekly, the assisted-living groups spent more of their income locally because of their reduced mobility. Thus, they had a higher impact on the local community. This study did not estimate the full economic impact of the retirees and did not address the fiscal impacts.

Meyer points out that the young-old and the old-old are often mobile for different reasons. The old-old may move for assistance, rather than amenity, reasons. From 1975-1980, elderly migrants to urban areas were older and more dependent than were migrants to rural areas. The services available in urban areas may be important to the old-old.

 In a study of metropolitan counties Mullins and Rosentraub found that near-retirement-age populations seem to have a lower demand for public goods. These preferences change quickly, however, and areas with higher proportions of post-retirement people spend more for public services. They warn that programs to attract older citizens may be both fiscally and socially unsound. Immediate windfalls from attracting higher-income, low-service-demanding, young elders may give way to an older population that will want and need expanded public services.

Clearly the bulk of the economic and fiscal impact literature does not distinguish between the wealthy and poor aged, or the young-old and the old-old. Studies that do treat the aged as a heterogeneous group tend to be focused on a single issue, such as health care. To

provide a more holistic view of the diverse nature of the impacts of differences across different types of aged, we employ a holistic modeling approach described below. The following sections provide a comparative economic and fiscal analysis of the young-old and the old-old, as Longino stressed is needed.

The Wisconsin Economic Impact Simulation Modeling System

To assess the economic and fiscal impacts of different types of elderly settlement patterns on local economies, we employed the Wisconsin Economic Impact Modeling System (Deller and Shields; Shields and Deller 1997a and 1997b; and Shields). The Wisconsin System builds on the work of Kort and Cartwright; Conway, Woods and Doeksen; Coomes, Olson and Glennon; Treyz, Rickman and Shao; and Rey by building an integrated (or conjoined) input-output/econometric model of rural Wisconsin counties. For conjoined models the IO component is used to determine industry outputs and primary factor demands. The econometric component estimates final demands, factor prices, and primary factor supplies. The aim is to retain the sectoral detail afforded by IO techniques and close it with a system of endogenous econometric relationships (Dewhurst and West). The advantage of this approach for assessing the economic and fiscal impacts of retiree settlement patterns is that it moves toward the "holistic" approach that is often lacking in this literature.

Model Overview

A graphical overview of the Wisconsin System is presented in Figure 1. The model is composed of six modules: 1) production, 2) labor markets (part I), 3) labor markets (part II), 4) retail markets, 5) housing markets and 6) local government (fiscal). All but the production module consist of stochastic econometric equations. To capture interrelationships, the modules are linked by one or more endogenous variables. Similar to other models of its type, the Wisconsin model recognizes two sources of economic demand, external and local. While growth in the county is driven primarily by export production, a number of local policy variables are available, allowing us to model locally induced demand shocks, such as the in-migration of retirees.

Intermediate production relationships in the local economy are represented by the input-output (IO) component. The IO model provides a very detailed production function, albeit dependent on a number of fairly strong assumptions. A common way to initiate a policy simulation in the Wisconsin System is to specify a demand shock—the scenario often involves reducing or increasing output for a single industry.   For this analysis the shock is the introduction of the expenditures of 500 households into the community. The IO core is used to estimate changes in output by industry due to changes in final demand.

The labor market components of the model are linked to the production sector via industry output as determined by the production component. Part I of the labor module estimates industrial employment and wages while part II examines unemployment and commuting patterns, population (including migration), total personal income and income distribution responses to the initial change in economic activity.

The remaining modules incorporate information provided by the labor market modules. Local retail sales rely on personal income, population and commuting patterns. Income and population change, among other things, drive the local housing market. Key forecasts from the housing sector include housing starts and property values. Income, population, and income distribution drive local government expenditures and revenues. Local government is also closely integrated with the local housing sector through property values. Given that the fiscal model is much less common in the literature than the IO model, particular attention is paid to the fiscal component of the model. A detailed description of the complete model is available in Shields.

The Fiscal Module: Theoretical Foundation

Modeling local fiscal behavior is a complex and daunting task. While there is a clear market mechanism for the interaction of supply and demand forces for private goods, such a market does not exist for public goods and services (Samuelson). The non-excludability and non-rivalness that characterize certain goods and services prevent the market from operating effectively (i.e., market failure).

By viewing the issues conceptually within a simple supply and demand analysis the challenge becomes more tractable (Chicoine and Walzer; Deller and Halstead; Deller 1996). Inman offers a modification of the demand-supply model for public goods and services delivery to capture the two-step process of decision-making to production. *Provision* of the good or service refers to the collective choice (i.e., demand) that determines what goods and services to provide, at what level, how to raise the necessary revenue, and how to arrange for the *production* of the good or service. The second step of the process is the actual production (supply) of the public good or service. *Production* of the good or service refers purely to the technical process of transforming inputs into outputs (i.e., the public good or service). It is vitally important to note that it is in the latter stage that actual *costs* are incurred. The importance of the distinction between *provision* and *production* can not be overstated (Cigler; Oakerson; Kolderie; ACIR; Deller and Halstead; Brooks). Given this simple theoretical framework, one can more easily dissect and analyze the problem of modeling local fiscal behavior.

Expenditures: The Demand for Public Goods Under situations of majority rule Black suggested that the behavior of the swing or median voter determined fiscal policy. By definition, the median voter is the voter in the middle; there are as many voters to the right of the median voter as there are to the left of her/him. When majority rule is the decision rule, the median voter is the swing voter and is decisive. The task of analyzing the local budgetary process is simplified because attention can be focused on the preferences of a single individual (the median voter) rather than the entire population. Bergstrom and Goodman, Deacon, and Pommerehne provide formal derivations and the number of empirical applications is large (Chicoine, Walzer and Deller).

Considering these other factors, a general form of the demand for local government expenditures can be expressed as:

$$\underline{govt\ exp\ =\ e(\ medinc\ ,populatn\ ,\tau,\Theta\ )} \tag{1}$$

where *medinc* is the income of the median voter, *populatn* is the local population, *t* is the tax-price of the public good, and Θ characterizes local tastes and preferences. A large number of

empirical applications follow this general framework (e.g., Bergstom and Goodman,

Pommerehne, Schwab and Zampelli, Chicoine, Walzer and Deller, Marshall, Wong).

A critical aspect of expenditure studies is the definition of tax-price. The most common

specification is that tax price is measured as the proportion of the total local tax borne by the

median voter (e.g., Bergstrom and Goodman, Holtz-Eakin). Typically, previous studies using

this measure find the tax price coefficient on the local tax burden to be negative and inelastic.

One potential reason that the elasticities vary across studies is because local tastes and

preferences are captured differently in each model. For example, Inman (1978) includes a

number of socioeconomic variables such as percentage Catholic and percentage elderly to

describe local school expenditures, whereas Deacon considers only tax price and income. As

Ladd notes, economic theory makes no general prediction about population elasticity for

expenditures

Expenditures: The Supply of Public Goods   Like the demand-side, there has been extensive

research on the supply and/or production of public goods. Fortunately, modeling the supply-side

requires fewer somersaults. The second step of Inman's model of local decision-making

considers *how* to provide the good (production). That is, once an output level is agreed upon,

local officials must decide on the best way to produce that output. If we are willing to assume a

plausible objective function for local officials, it is possible to proceed with basic tools of

neoclassical economic theory. Specifically, we can think of local officials choosing the vector of

inputs **x** that minimizes government costs subject to a specified level of demand for a public

good (fixed utility) (Deller and Halstead; Deller 1996).

Formally the problem is solved by

$$c^*(\mathbf{w}, pg) = min \; \mathbf{wx} \quad st \; \mathbf{x} \in V^*(pg) \quad\quad\quad\quad (2)$$

where ***w*** is a vector of input prices, *pg* is output, and *V(pg)* is the subset of all input vectors that

yield an output level of at least *pg*. In this specification, c(***w**,pg*) captures the underlying

production (supply) relationship. Doekson and Peterson (1987) catalog much of the enormous

body of empirical literature that purports to construct empirical cost relationships. This literature provides the foundation of the supply-side of the module.

Expenditures: Reconciling the Approaches   Our inability to observe either the price or quantity of local public goods makes it difficult to estimate their demand and supply empirically. Acknowledging that a direct set of simultaneous equations jointly determining price (tax price) and quantity is empirically intractable we adopt the approach of Hirsch (1970 and 1977), Beaton (1974), and Stinson and Lubov (1982). In this framework the provision (demand) decision is *nested* in the production decision.

On the demand-side, we invoke the notion of the median voter, with public good demand (pg^d) modeled as a function of income, population, tax price and local tastes and preferences., or:

$$pg^{\,d} = d(\ medinc\ ,populatn\ ,\tau,\theta\ ) \tag{3}$$

On the supply-side (pg^s), we adopt the cost function approach, or:

$$pg^{\,s} = c(\ w,pg^{\,d}\ ) \tag{4}$$

The demand equation can then be substituted into the right-hand side of the supply equation, giving:

$$pg^{\,s} = c(\ w,d(\ medinc\ ,populatn\ ,\tau,\theta\ )) \tag{5}$$

Now, by assuming that the average (per capita) cost function of a public good represents a reasonable proxy for supply, a cost function can be derived. Here, average cost is a function of input prices, income, population (to capture congestion effects) and local tastes and preferences, or:

$$govt\,exp = e(\ w,medinc,populatn,\tau,\theta\ ) \tag{6}$$

By modeling expenditures in this way, we are assuming that service delivery levels and tax prices are in equilibrium. The expenditure equation can thus be interpreted as a reduced form equation flowing from a conceptual set of structural demand and supply considerations.

Local Government Revenues Revenue equations are difficult to model in a theoretical sense because revenue sources are often structured in accounting terms and definitions. For example, property tax revenues, are defined simply as the product of the local property tax rate and local property value; thus local property tax revenues are easily determined. It is obvious, though that factors that influence property values are critical in understanding local property tax revenues, a point expanded upon below.

Intergovernmental revenue, state revenue sharing in Wisconsin is determined by formula; thus, the revenue sharing formula can be used to estimate those revenues.[2] A large source of local revenue in Wisconsin comes in the form of state revenue sharing. For 1997, the Wisconsin Department of Revenue (WI-DOR) reports that nearly $1 billion in state tax monies were allocated across counties and municipalities. According to WI-DOR, the state shared revenue program "provides no-strings-attached aid to municipalities and counties" (WI-DOR, 1997).

While the shared revenue formula consists of several different components, we focus on aidable revenues, which account for 80 percent of the revenue sharing in Wisconsin.[34] The general formula municipal revenue sharing is calculated as follows:

aidable revenues=3 yr avg. of local purpose revenues*tax base weight (7)

where :

$$tax\ base\ weight = 1 - \left(\frac{per\ capita\ EAV}{s\tan dard\ value\ per\ person} \right). \qquad (8)$$

Local purpose revenues are defined as local property tax levies plus certain other locally raised revenues. The tax base weight can not be less than zero. The standard value per person acts

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[2] The real interest is in modeling the forces that affect the formula, a problem revisited later.
[3] Several smaller programs that I ignore here include a fixed per capita payment, compensation for utility property and the minimum payment-maximum adjustment provision that tries to smooth out year to year volatility.

[4]

like a state guaranteed tax base and is set annually by the state such that all budgeted aid dollars are allocated. From this formula it is obvious that per capita equalized assessed value (EAV) and per capita property tax revenues are important determinants of state revenue sharing. It is important to note that this formula excludes revenue sharing for education, which is accounted for separately.

The Fiscal Module: Empirical Specification

Because we usually cannot observe either the price or quantity of local public goods, it is difficult to estimate their demand and supply empirically. Instead we only have expenditure data, which makes it hard to separate consumption and production. These complicating factors necessitate an alternative approach to operationalize the model.

The Wisconsin System retains the notion of the median voter for the demand side, and adopts the approach of Hirsch (1970) and (1977); Beaton; Stinson and Lubov; and Johnson, Ma and Scott when modeling the supply side. This approach acknowledges that a direct set of simultaneous equations jointly determining price (tax price) and quantity is empirically intractable. Instead, we assume that the average cost function of a public good represents a reasonable proxy for supply. This cost function is easily estimated: the average cost is a function of the level and quality of services, important local characteristics (input factors and demand factors), input prices, and population growth. We provide more detail on the expenditure equations in the empirical sections.

By modeling expenditures in this way, we are assuming that our observations of service delivery levels and tax prices are at their equilibrium levels. Thus, each equation can be interpreted as a reduced form equation flowing from a conceptual set of structural demand and supply considerations. It is important to note that by estimating a set of reduced form equations we can track changes in the equilibrium level, but we can not recover the parameters of the structural equations themselves.

Revenue equations are more difficult to model in a theoretical sense because revenue sources are often structured in accounting terms. For example, state aid to counties from

revenue sharing is formula driven. Still, because we know that a primary purpose of revenue sharing is to help smaller, poorer communities, we can gain insight into the factors most likely to affect the distribution of this aid, such as local poverty rates and per capita income. Property tax revenues are a second important source of local revenues and depend primarily on the assessed value of local property and the local property tax rate. Property values are modeled endogenously, reflecting the performance of the local economy.

Six expenditure and two revenue categories are considered. Expenditures include: total, police and fire, waste disposal, road maintenance, health and human service and general government. A separate stand-alone equation is specified for public school expenditures. Revenues include: state aid revenue and property taxes. All dependent variables are measured on a per capita basis.

The econometric reduced form expenditure and revenue equations take the form:

$$E_i = r_{j0} + r_{i1}y_t + r_{i2}lp_t + r_{i3}t_t + r_{i4}v_t + S_{ii}r_{ii}q_{ii} + r_{iz}r + e_i \qquad (9)$$

$$R_k = t_{ko} + t_{k1}y_t + t_{k2}lp_t + t_{k3}t_t + t_{k4}v_t + S_{kn}t_{kn}q_{kn} + t_{kz}r + e_k \qquad (10)$$

where E is per capita expenditure for public good j, R is per capita revenue from source k, y_t is per capita income, t_t is a tax price measure, v_t is per capita equalized assessed property values, and q represents socioeconomic characteristics based on a review of the median voter and fiscal impact literature. These variables, which vary by equation, include population growth rates, local poverty and unemployment rates, the local crime rate, etc. We elaborate on the specification of the individual equations in the results section. Because it is reasonable to assume that the unobserved terms (e) are correlated, equations (9) and (10) are estimated by via seemingly unrelated regression (SUR) to ensure efficient parameter estimates.

This approach is not without problems: the notion of congestion complicates the analysis. Because public goods are jointly consumed, the number of beneficiaries is an

important consideration. Most public goods can accept additional use up to a capacity threshold. Until this threshold is reached, marginal costs of additional users are minuscule. Upon reaching the threshold, congestion becomes an issue, and the impacts of adding additional consumers can be significant. An obvious example is a public school. When capacity is exceeded, local decision makers must consider building a new school. Unfortunately, the equation outlined above does not do a good job of addressing the discrete nature of some public goods. The upshot is that analysts should interpret model results with an understanding of current local capacity conditions.

Expenditure, revenue and assessed property valuation data is from the Wisconsin Department of Revenue. Taste and preference data is from Woods and Poole Inc. and the census.[5] To ensure consistency in the analysis, all revenues and expenditures are aggregated to the county-level. Because local public services in Wisconsin are provided within a tiered system between county and municipal governments, this is a reasonable approach.

Scenario Description and Data

To assess the economic and fiscal impacts of alternative elderly settlement patterns two separate patterns are constructed and simulated through the Wisconsin System. Each simulation assumes that 500 households relocate into a rural region in north-central Wisconsin.[6] As such, the scenarios take the form of exogenous in-migration of two different household types. The household types are: 1)households age 65 to 75, the young-old and 2) households over age 75, the old-old. This breakdown allows us to make comparisons between younger and older

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[5]The data source used here is from Woods & Poole Economics Inc., located in Washington DC. Woods & Poole is a small, independent corporation that specializes in long-term county economic and demographic projections. The Woods & Poole database contains more than 550 economic and demographic variables for every county in the United States for every year from 1969 to 2020. There are three primary advantages to using the Woods & Poole database. First, using various statistical and accounting methods the "holes" in the BEA-REIS database resulting from disclosure rules are filled. Second, the Woods & Poole database contains additional economic variables such as retail sales and income distribution and demographic variables such as age cohorts. Third, based on a collection of regional economic models described below, the Woods & Poole database contains annual forecasts of each variable to the year 2020. In one regard, the Woods and Poole Economics Inc. database represents a "one-stop" data center.

[6] The region selected is the three county area of Oneida-Forest-Langlade in north central Wisconsin. Total population of the three county area is 63,000 with a per capita income of $16,551 (see Tables 2a-2d for descriptive statistics). This is an amenity rich area that is experiencing significant in-migration of retirees to seasonal lake front property.

retirees. From a modeling perspective this comparison is akin to examining the change in a community as in-migrant retirees age.

Because the conjoined Wisconsin System has an input-output model at its core the two scenarios are best described in terms of the changes in final demand that different households types present to the local economy. To do this we turn to the 1995 Bureau of Labor Statistics Consumer Expenditure Survey (BLS-CES). Pervious work with these data shows that there are significant differences in spending habits between household types (Rubin and Nieswiadomy) and these differences can be used to assess differences in economic and fiscal impacts (Sastry).

The expenditure patterns of a representative household for each of the two groups are presented in Table 1a while the economic characteristics of the young-old and old-old households are summarized in table 1b. Of particular interest for this comparison is the difference in expenditures between the two groups. The young-old spend approximately $25,300 annually while the old-old spend $18,600. The BLS-CES categories had to be aggregated to coincide with IMPLAN, the source of the Wisconsin Models core input-output. Given the reported categories of expenditures and industries (commodities) some BLS-CES data are lost to IMPLAN, hence the total aggregate expenditure levels in Table 1a and 1b differ by the lost BLS-CES data. The category that accounts for the largest discrepancy is "entertainment."

These households also differ by factors other than expenditure patterns. For example, a typical young-old household has 1.9 persons while an old-old household has 1.5 persons (Table 1b). In addition, young-old households have, on average, 0.6 earners within the household, while old-old households have only 0.2 earners. These are important differences when describing scenarios to the Wisconsin Economic Impact Modeling System. For the simulations reported here differences in household sizes means initial population changes of 950 versus 600, which has significant implications for the simulated impacts.

The difference in number of earners also has implications because it requires the scenario construction to reflect where these persons will be employed. Contrary to popular perceptions, not all elderly retire from the labor force. Many elderly work part-time for either personal or financial reasons. Given the descriptive information reported in Table 1b, 500 additional young-old households suggest that will be 300 (=500 * .6) persons in the work force and 100 (=500 * .2) persons for old-old households. For simulation purposes we assume that these "new" entrants to the local labor force are evenly distributed across the Trade and Service Sectors. The predominate sources of part-time employment in rural areas are in these sectors. In addition, the impacts of elderly consumption on local job creation are also predominately in these sectors.

The fact that the typical household in our scenarios has a person in the labor force part-time is not inconsistent with the literature on aging and work. While Cockerhill observes that the percentage of persons over age 65 remaining in the workforce is steadily declining, Palmore notes that the more educated elect to remain in the labor force for a number of reasons. Some older persons are in professions that can be carried over into retirement years on a consulting or part-time basis and are not necessarily site specific. Kurt suggests that, due to changing occupational structure and health status of older persons in general, many elderly elect to return to work in part-time services jobs or as self-employed. Cox further contends that low-income, unmarried retired women are "very likely" to work at least part-time to supplement social security payments. Haas and Serow found that among in-migrant retirees in Western North Carolina, 30 percent of the households had someone in the laborforce. While the motivation to return to, or remain in, the labor force may vary across the two groups studied here, the scenario with some level of employment in elderly households is consistent with the literature.

As reported in Table 1a, not only is the difference in total level of expenditure (i.e., change in final demand) significant across the two household types, but the pattern of expenditures across categories is significantly different as well. The young-old, for example, spend $2,610 for food at home and $1,285 for food away from home whereas the old-old spend $2,069 for food at home and only $698 for food away from home. Clearly, such fundamental

differences across household types will significantly alter the nature and magnitude of their economic contribution to the local economy. The young-old spend much more on vehicles than the old-old, as well as on apparel and miscellaneous retail. While the two groups spend nearly similar amounts on shelter and rented swellings, how those expenditures are divided differs significantly. While the two type of households pay nearly the same in medical services and drugs and medical supplies, that amount is being spent for a smaller household for the old-old household.

Direct and indirect (note Type I multipliers are used, not Type II or Type III) changes in total industrial output (TIO), computed via IMPLAN, were fed into the labor market module to determine changes in employment and wages. These changes were in turn used to estimate changes in unemployment, commuting patterns, population and per capita income. Finally, changes in population, employment and per capita income were fed into the housing, fiscal and retail modules to simulate "induced" impacts. The current version of the model provides a "before" (i.e., baseline) and "after" picture with the difference attributed to the scenario under consideration.

While the detailed information off the BLS Consumer Expenditure Survey provides us with a refined description of the economic characteristics of the different households, we do not have data on specific taste and preference characteristics. For example, the old-old may prefer to devote greater resources to hospitals or police protection than the young-old. Hence, when interpreting the results it is important to keep in mind that the simulated results are based on IO computations and econometric estimations. Subtle, but important, differences in political philosophies that may exist between household groups are lost.

Simulated Economic and Fiscal Impacts

The simulated impacts of 500 new households of each of the two household types are reported in Table 2a through 2e. Those interested in reviewing the detailed econometric results are referred to Shields and Deller (1997a and 1997b) and Shields. While the fiscal impact is the

focus of this paper, three important variables -employment, population and income- from the other modules of the model drive the fiscal component, hence warrant consideration here.

Overall Impacts

The simulated results for the labor market modules part I and II (employment, earnings, population, migration and commuting) are provided in Table 2a. For the young-old households the BLS-CES data suggest that 500 new household will create 300 initial jobs and a total of 399 jobs for an implicit employment multiplier effect of 1.33, or 0.42 jobs for every person in the household. This compares with 100 initial jobs for the old-old, with a total employment impact of 173 jobs for an implicit multiplier effect of 1.73 or 0.23 jobs for every person in the household. Clearly the larger employment impact for the young-old households comes from a) more persons in the young-old household remaining in the work force and b) higher levels of expenditures in the local economy.

Impacts on income are measured two separate ways: earnings and per capita income. As reported in Table 2a, earnings per worker decrease slightly from the baseline under both the young-old (-$35 or -0.18%) and old-old (-$13 or -0.07%) scenarios. While the reduction in per worker earnings resulting from the in-migration of the old-old is not unexpected, the larger reduction in per worker earnings from in-migration of the young-old is unexpected. This result is in part due to scenario construction: we assume that all retirees who are working in the local labor force will earn prevailing wages in the Trade and Service sectors, which are lower than the regional average wage, and the majority of jobs created in both scenarios go to the elderly themselves. In addition, many of these new workers work part-time. Thus, the large increase in part-time workers also lowers earnings per worker. Per capita income, also declines (Table 2b). Under the old-old scenario, per capita income declines by $51 or -0.31 percent, and under the young-old scenario by $44 or -0.27 percent.

A third important variable feeding into the fiscal impact module is population. While the initial effect determined by the scenario, in-migration, dictates the bulk of the population impact, the ripple or multiplier effect in employment, earnings, changes in relative housing prices, and

unemployment will influence population changes through indirect migration. The estimated population impacts are reported in Table 2b. For young-old households, the initial effect is 950 (=500*1.9) additional persons and an indirect effect of 125 persons for a total population change of 1,075 persons (1.7% increase). For the old-old households, the initial effect is 750 (=500*1.5) additional persons and an indirect effect of an additional 92 persons for a total population change of 842 persons (1.33% increase). Note that while the individual income measures (per worker earnings and per capita income) may fluctuate downward, the increase in population dictates that total earnings increase (Table 2a).

The Wisconsin Model also provides insight into the impact of these two distinct groups of retirement households on local housing and retail markets. Under both scenarios the demand placed on the local housing market results in similar increases in construction and higher prices for new construction (Table 2b). Under the young-old scenario the equilibrium number of new houses being built increases by 197 with an average value of about $70,000, or a 3.22 percent increase in value. Under the old-old scenario, the increase in equilibrium is 192 new houses with a value of about $70,000, or 3.21 percent increase.

When compared to the estimated market value of owner-occupied homes from the BLS-CES profile (Table 1b), the Wisconsin model seems to underestimate the impact that these types of households might have on the local housing market. In short, the model presumes that the in-migrants are leaving one housing market and entering another with perhaps very different equilibrium levels. Still, the model captures changes to the aggregate market, not the specialized markets that retirees may be entering.

While total retail sales increase, the change in per capita expenditure levels by retail type varies in several cases (Table 2e). Per capita retail sales increase for both scenarios only in apparel, about 0.3 percent, and drug stores and general retail. For the young-old drug store retail increases about 0.2 percent while for the old-old the increase is only 0.02. General retail

also increases more for the young-old, 0.26 percent, than for the old-old, 0.04 percent. For the young-old scenario building retail also increases.

Auto retail per capita decreases in both scenarios, but it decreases -0.24 percent for the old-old and only -0.06 percent for the young-old. For all other types of retail, per capita sales decrease more in the young-old scenario than in the old-old. The young-old generally are more mobile than the old-old, so the old-old may shop more in the community than the young-old.

Fiscal Impacts

The fiscal impacts of the scenarios presented in this study are reported in Tables 2c and 2d. Aggregate per capita non-education expenditures *decrease* by $2.20 (or -0.27%) for the young-old scenario, but they decrease less, $1.36 (or -0.17%), for the old-old scenario. Econometric results suggest that public goods (as measured by expenditures) are normal goods and significant differences in income levels will have significant impacts on service levels. The decline in per capita expenditures for the young-old is explained simply by the empirical result that population in this scenario is growing faster than expenditure levels, thus driving the per capita estimate downward. Under the old-old scenario, per capita expenditures do not decline as much because population, is not growing as rapidly. It is important to keep in mind that total expenditures increase under both scenarios, they increase more rapidly under the young-old (1.43%) than under the old-old (1.16%) scenario.

Under both scenarios per capita public expenditures increase for waste and amenity services and for general government. Per capita health expenditures decrease -0.77 percent in the young-old scenario compared with -0.36 percent in the old-old scenario. Per capita safety expenditures also decrease more in the young-old scenario, -0.58 percent, compared with the old-old scenario, -0.33 percent. Per capita road expenditures decrease similarly for both scenarios. In addition to reflecting differences in tastes and preferences for public services, these results also hint to possible costs savings through economies of scale in the production process.

Again, however, total expenditures for all categories increase. For the young-old scenario total non-education expenditures within the three county region of analysis increase by about $733,477 (1.43%); while for the old-old scenario the increase is less, $569,956 (1.16%). The driving factors behind the differences in absolute spending increases are higher population impacts and higher levels of income (both per capita and aggregate income) under the young-old retirement scenario. In no category did aggregate expenditures decline.

There are differences in support for public education across the two age groups examined here. For the young-old, per capita expenditures on public education decrease by $19.51 (-1.63%), but increase in total by about $803,000 (1.06%). For old-old retirees, per capita expenditures do not decline as much, $5.39 (-1.29%), but total education expenditures increase less, about $652,000 (.86%). The difference in per capita expenditures hinges on rates of change in population across the two retirement household types. Elderly tend not to increase demand for public education services (i.e., no school aged children), but they do expand the property tax base (e.g., housing), which supports public education. While total expenditures on schools increases under both scenarios ($1.4 to 1.6 million) the larger change in population under the young-old scenario suggests that the denominator is growing faster than the numerator, hence the ratio declines.

Elderly migration also affects the ability of local governments to generate revenues (Table 2d). Both scenarios show a small increase in property taxes per capita ($0.01 or 0.00%). In Wisconsin, the state aid revenues are a significant portion of local revenues and simulated impacts of economic changes on aid flowing to local governments must reflect the unique aspects of the formulas. For the young-old scenario, total intergovernmental revenues per capita decline ($1.28 or 0.30%), but increase in aggregate ($385,000 or 1.40%). In the old-old scenario, total intergovernmental revenues per capita decrease less ($.09 or -0.18%) and increase less in aggregate ($316,000 or 1.15%). The difference in per capita intergovernmental aid impacts rests on the uniqueness of the Wisconsin formulas: as local governments increase

expenditures and corresponding property tax rates, the aid formula increases the flow of dollars to place downward pressure on property taxes. In other words, the aid formulas are set up to "reward" those local governments who place higher values on local public services (i.e., spend more) and are willing to tax themselves to pay for that higher level of service (i.e., higher per capita property taxes).

In the end, total local government revenues increase under the young-old scenario by $1.6 million (1.62%) and by $1.2 million (1.28%) under the old-old scenario. Under these two scenarios it *appears* that elderly migration of all ages pays for itself . Under the young-old scenario non-educational expenditures increase about $733,000 while government revenues increase $1.6 million. Under the old-old scenario non-educational expenditures increase about $600,000 and revenues increase $1.2 million.

It is important to note that not all expenditure and revenue categories are included in the analysis. On the expenditure side, capital improvement and the small "miscellaneous" categories are excluded; and on the revenue side fees, charges and other "miscellaneous" sources are not considered. For most small rural communities, however, these categories tend to be small and should not play a significant role in the final analysis.

Conclusions

The economic and fiscal impacts of elderly settlement were examined within the context of a conjoined input-output/econometric model of Wisconsin counties. Using the BLS Consumer Expenditure Survey, a series of household expenditure patterns were constructed. The conjoined Wisconsin model was used to simulate the impact of two elderly in-migration scenarios--young-old (65-75) and old-old (over 75) elderly households. These households are proxies for the aging of in-migrant retirees.

The results do not support the fear of the "gray peril." While per capita earnings and per-capita incomes decline this is mainly because the majority of new jobs created are part-time jobs for the elderly in these households in the trade and services sectors. Total earnings and

total incomes increase, as do total retail sales. Some retail sectors increase total sales more rapidly than others.

Government expenditures per capita decrease in some areas, perhaps suggesting the existence of scale economies, and increase in other areas, suggesting a more conventional supply curve. Property taxes per capita increase, although per capita local revenues decline because of changes in intergovernmental revenues. Overall, total expenditures increase, but less than the increase in revenues. Revenues increase nearly twice as much as expenditures, under both scenarios.

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