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and the
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Abstract

Migration to the suburbs is a long-standing problem for cities in the United States. We would expect that if cities offer better services, it would persuade affluent residents to stay in the city. We present a model where, even if improvements in services are exogenously financed, this intuition does not turn out to be true. *Journal of Economic Literature*
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FEDERAL GRANTS AND THE FLIGHT TO THE SUBURBS

1. Introduction

An important problem facing major cities in the United States is the loss of their middle income and affluent population to the suburbs. Examples abound: New Orleans, Chicago, Washington, D.C., Miami, etc. This trend has been present for at least four decades, and it does not give signs of stopping. As late as 1994 more than two million people (in net terms) moved out of the central cities, and an almost equivalent number moved into the suburbs. The problem is compounded by the decline in the number of jobs located in central cities. Suburbs have consistently gained in population and jobs, and as a consequence central cities have lost a substantial portion of their tax bases. The problem is serious enough that the U. S. Congress took over temporarily the finances of Washington, D.C., while the state of Florida appointed an oversight board to restore the financial health of the city of Miami. Given this trend, a question that has been at the center of numerous political and scholarly debates (see, for example, Glaeser (1998), Quigley (1998), Norquist (1998)) is: can cities be saved? In this paper, we contribute to this debate by exploring the effects of policy reforms designed to improve the quality of public goods and services in central cities (such as urban infrastructure, police protection, public schools) on the flight to the suburbs.

Two major categories of theories have been proposed to explain the suburbanization of populations of big cities. On one hand, there is the so-called “natural evolution theory” (also called the “accessibility model”, Follain and Malpezzi, 1981). This theory stresses the fact that suburbanization occurred as a natural consequence of economic growth, rising real incomes, and cheaper and better transportation over

time. In the outskirts of the central city, land was cheaper, so that higher income residents would prefer to move to farther areas. This effect was enhanced by better roads and superior and more affordable cars. Over time employers started to locate in the suburbs as well, to take advantage of lower land costs and the proximity of an educated labor supply.

On the other hand, there is the “flight from blight” theory. Central city residents left the city because of deteriorating conditions: high taxes and crime rates, low quality of schools, poor services, etc. This decline generated a self-enforcing effect: as the more affluent residents left, the tax base of the city shrunk, which caused a further deterioration of the city’s problems. In turn, more higher income residents migrated away from the city, shrinking the tax base even more, and so on.

Both theories seem to have empirical support. Bradford and Kelejian (1973) and Grubb (1982) present evidence for the flight from blight theory. Follain and Malpezzi (1981), in a study comparing housing costs in the central city and the suburbs, conclude that differentials can be explained by a combination of the two theories. Mieszkowski and Mills (1993) note that the two theories are empirically “observationally equivalent”.

While the two theories may be consistent with the data, the “flight from blight theory” offers hope in solving this problem. It suggests that it is possible to reduce the flight to the suburbs by improving the quality of public goods and services in the central city. In this paper we analyze the effects of such reforms designed to improve the quality of life in central cities on the flight to the suburbs.

Given the current status of cities, central city governments would have to raise tax rates substantially to finance these reforms. For most reasonable parameter values taxpayers are sufficiently mobile, so that cities are unable to raise taxes enough to finance needed reform without inducing too much flight to the suburbs. If the federal or state government intervenes, however, and gives grants to the city to improve the quality of services it provides, then the problem seems to be

solvable since the city does not have to raise taxes to carry out these reforms and can subsequently stop this vicious cycle. We find, paradoxically, that even if these reforms are exclusively financed by the federal or state government, and even if the grant money indeed goes towards improving the quality of public goods and not towards redistribution, we may have more flight to the suburbs.

The intuition underlying this result is as follows. In a framework where the central city government follows a redistribution policy from the rich to the poor by virtue of the majority status of the poor in the city, the threat power of the rich is implicitly measured by their ability to migrate to the suburbs. Better quality of public services make the rich more attached to the city and hence more vulnerable to the taxing power of the central city government. For any given tax rate, an increase in the quality of public services makes the rich more attached to the city. The central city government will take this into account by increasing the tax rate imposed on the rich. It turns out that the increase in the tax rate may be sufficiently large as to induce more outward migration than without the reforms.

It follows that even federally subsidized programs to save cities from the flight problem may lead to the opposite effect by allowing central city governments to have more taxing power than before. This suggests that federal programs designed to save cities from their plight should take into account the strategic forces at play between the city and its affluent residents.

This work is most closely related to the papers of Brueckner (1983) and Turnbull and Niho (1986). Brueckner characterizes the optimal dynamic tax policy of a central city government whose goal is to redistribute income from the rich to the poor by virtue of the majority status of the poor in the city taking into account the fact that high tax rates induce migration of the rich to the suburbs. Within this framework, he analyzes different policies that are aimed at putting a limit on the redistributive power of the central city government. Turnbull and Niho develop a model where capital owners (or rich residents) migrate to the suburbs in response to

property tax rate differences between the central city and the suburbs. Within this framework, they analyze the effect of block grants as well as conditional grants to the city on the demand for local public goods by city residents. They conclude that a block grant, for instance, loosens the budget constraint of the city in the short run and the resulting optimal short run tax rate decreases. This induces migration to the city which in turn decreases the tax share that the city residents bare in the long run. Hence the demand for local public goods increases in the long run. In the short run, however, the change is ambiguous. Turnbull and Niho's framework is quite powerful in analyzing how the demand for local public goods by city residents changes to retain taxable capital in response to block grants and conditional grants.

In contrast, our paper focuses on the effect of federal or state aid specifically targeted to improve the quality of public services and amenities in the central city on the flight to the suburbs. We have in mind grants to improve police protection, to provide art museums, public parks and improve urban infrastructure that would attract the rich to the city.¹ Proponents of these targeted grants state that, since these grants would be used exclusively to improve the quality of public services in the central city and cannot be used for redistributive purposes, they would stop the vicious cycle and attract the rich to the central city. This would be a first step towards rebuilding the tax base in the city. Our analysis shows that these grants may in fact worsen the problem by allowing the city to have more taxing power. This suggests that the federal or state government should take into account the strategic forces at play between the central city government and the city residents.

Finally, in our framework, the central city government follows a redistribution policy from the rich to the poor via an income tax. In general, redistribution at the city level can be either done indirectly through property taxes, whereby the

¹ An example of what we have in mind is the "liveability" agenda pursued by Vice-President Al Gore.

rich finance a disproportionate share of the local public (like Turnbull and Niho), or through direct redistribution where central city governments directly subsidize the poor or provide them with government jobs like in Washington, D.C and the city of New York. In this paper, we have in mind this kind of redistribution (see Alesina, Baqir and Easterly (1998) for a very recent study on the way many cities in the U.S. use public employment as a redistributive device).

Section 2 describes the model. Section 3 presents our results and section 4 concludes the paper.

2. The Model

We have an economy with two locations, the central city and the suburbs, and two groups of people, the rich and the poor.² The number of poor in the city, denoted by m , is fixed over time. The number of rich in the city, n , may vary since the rich can move to the suburbs at will³; hence, n is a function of time. The rich and the poor have incomes $x(t)$ and $y(t)$ respectively. The central city government follows a redistribution policy from the rich to the poor by virtue of the majority status of the poor in the city, via an income tax. Redistribution at the city level can either be indirect through property taxes (whereby the rich finance a disproportionate share of the local public good) or through direct redistribution, where central city governments directly subsidize the poor or provide them with government jobs like in Washington, D.C and New York City. In this paper we

² Our framework is inspired by Brueckner's (1983).

³ We assume that the poor do not leave the city. Cities are attractive to the poor for a variety of reasons: because transportation costs are lower, the public goods bundle available (which includes welfare spending) and social networks (see Glaeser, Kahn and Rappaport, 1997; Glaeser, 1998). Also zoning regulations usually make it difficult for the poor to access housing in the suburbs.

consider this second kind of redistribution. For an excellent treatment of the first kind of redistribution, see Turnbull and Niho (1986).

The tax rate applied to the rich at time t is $\sigma(t) \leq 1$, so that disposable income for the rich in the city at time t is $(1 - \sigma(t))x(t)$. The poor's per capita disposable income, after receiving the transfer, is $y(t) + \frac{\sigma(t)n(t)x(t)}{m}$.

The rich have the option to move to the suburbs, where no taxes are levied.⁴ The migration rate of the rich is proportional to the difference between suburban and city incomes :

$$\frac{\dot{n}}{n} = \alpha\sigma(t)x(t), \quad \text{where } \alpha < 0.$$

Note that the rich do not leave at once from the city. Our model reflects the fact that the rich are a heterogeneous group of agents, who weigh life in the city versus life in the suburbs differently. As a consequence, members of the rich group will leave at different times.

We now introduce the notion of "quality of services and amenities" in the model. We have in mind the quality of police protection, art museums, public parks, etc. Better quality of these public services in the city provides an additional incentive for the rich to stay in the city and not migrate to the suburbs, other things equal⁵. We introduce this feature in the equation of motion by adding a parameter γ :

$$\frac{\dot{n}}{n} = \alpha\sigma x + \gamma \tag{1}$$

This parameter, γ , is positive and represents the quality of amenities available in the city. A higher γ reflects better amenities in the city. Note that an increase in γ reduces the migration rate of the rich to the suburbs for any given tax rate σ the city may choose.

⁴ Of course, the analysis will not be affected if the suburban tax rate is positive. The important point is that the suburban tax rate is less than the city's tax rate.

⁵ In Vice-President's Al Gore words, increasing the quality of services makes the city more "liveable".

The purpose of this paper is to analyze the effect of improvements in the quality of public services and amenities in the city through exogenous grants (which may come from the federal or the state government). In our framework γ is exogenous. An alternative approach would be a model where the quality of public services is an endogenous policy variable chosen by the city government. Within such a framework, basic economic theory tells us that the city government, following a federal grant, part of the federal money will eventually go towards redistribution due to income effects, even if the grant was earmarked to public goods that were previously financed by the city.⁶ However, empirical evidence suggests that most of the federal grant will indeed go towards the public goods and not for redistribution, or “money sticks where it hits”. This is the well documented flypaper effect (see Courant, Gramlich and Rubinfeld (1979) and Oates (1979) for seminal papers on this issue, and Hinz and Thaler (1995), Strumpf (1998) and Wyckoff (1991) for more recent treatments). Hence, to a first approximation, the main effect of a federal grant is to reduce the migration of the rich to the suburbs.

In other words, in our framework, there is a certain optimal level of local public goods in the city and this amenity affects the rate at which the rich leave. Given the flypaper effect, federal grants raise public goods provision above the original level by approximately the amount of the grant and the main effect of this is to reduce the rate at which the rich migrate. Thus, in the interest of simplicity and in light of the empirical evidence of the flypaper effect, we choose to leave the local public goods sector in the background.

The city planner’s problem is to choose the control variable σ to maximize the

⁶ Within such a framework, following a federal grant, the demand for redistribution will change due to income effects. To use part of the grant for redistribution, the optimal city tax rate must decrease. This affects the migration of the rich to the city which, in turn, has an effect on the tax share that the city residents bare in the long run. Hence, the demand for local public goods changes.

utility of the poor⁷:

$$\max_{\sigma} \int_0^T u \left(y + \frac{\sigma x n}{m} \right) e^{-it} dt$$

subject to the equation of motion

$$\frac{\dot{n}}{n} = \alpha \sigma x + \gamma \quad (2)$$

and the boundary conditions $n(0) = n_0$ and $n(T) = n_T > 0$.⁸ Another initial condition is discussed below, which we need to solve a second order differential equation.⁹

This optimal control problem can be easily transformed into a calculus of variation problem, which will make the analysis simpler. From equation (2), we have $\sigma = \frac{1}{\alpha x} \left(\frac{\dot{n}}{n} - \gamma \right)$. Letting $\beta = \frac{1}{\alpha m}$ (note that $\beta < 0$) and substituting for σ in the objective function of the city planner, we get the following alternative problem:¹⁰

$$\max_n \int_0^T u \left(y + \beta (\dot{n} - \gamma n) \right) dt \quad (3)$$

subject to

$$n(0) = n_0 \quad (4)$$

Problem (3) is a calculus of variations problem where n is the state variable. The Euler equation for (3) is given by

$$\frac{\partial u}{\partial n} - \frac{d}{dt} \left(\frac{\partial u}{\partial \dot{n}} \right) = 0 \quad (5)$$

⁷ As shown in the objective function the city only cares about the poor. In reality, cities consider the welfare of all its residents, of course, but we believe that as a stylized approximation (given that the lower income residents are in such majority in many central cities) our model is justified.

⁸ This last condition reflects the fact that the central city government wants to maintain some balance in the central city's population make up, avoiding the erosion of the tax base altogether (see Conley and Dix (1999) for a treatment when some rich people stay in the city).

⁹ For notational ease we omit t in the notation of the time varying variables.

¹⁰ Without loss of generality, in what follows we will assume that the discount rate i equals zero.

This leads to:

$$-u' \beta \gamma - \beta u'' \frac{d}{dt} (y + \beta(\dot{n} - \gamma n)) = 0 \quad (6)$$

Since we are interested in deriving explicit solutions, we consider utility functions satisfying $\frac{U''}{U'} = C^{11}$ (note that C is negative). With this assumption, the above equation reduces to

$$\ddot{n} - \gamma \dot{n} = -\frac{\gamma}{\beta C} \quad (7)$$

The characteristic equation of (7) has two distinct real roots; and, since the coefficient of n is zero, its particular integral is non-constant. Hence, to solve this differential equation we need two initial conditions; one for $n(0)$ given above. The other boundary condition constrains the value of \dot{n} at time 0. It is written $\dot{n}(0) = k$. The parameter k is assumed to be negative. This reflects the fact that at time zero, there is outward migration of the rich to the suburbs. Recall that the purpose of the federal grants is to reduce this flight to the suburbs.

Solving the differential equation in (7) and using the boundary conditions, we get

$$n(t) = n_0 - \frac{k}{\gamma} + \frac{1}{\gamma \beta C} + \left(\frac{k}{\gamma} - \frac{1}{\gamma \beta C} \right) e^{\gamma t} + \frac{1}{\beta C} t \quad (9)$$

3. Results

We now analyze the effect of federal or state grants designed to improve the quality of public services in the central city on the flight to the suburbs. One would expect that since the grants cannot be used for redistribution and are exclusively

¹¹ This is a common assumption in intertemporal problems if explicit solutions are to be derived. For instance, see Barro and Xala-i-Martin (1995), chapter 1.

used to improve services, they would result in less migration, since that would attract the rich to the city. However, as we shall see, this intuition does not hold.

We start by analyzing the effect of improved quality of public services on the optimal tax rate imposed by the central city government on the rich. The following proposition shows that the tax rate chosen by the central city government is increasing in the quality of public services.

Proposition 1. *The optimal tax rate chosen by the central city government is increasing with better quality of services.*

Proof/

We have to sign the following expression for $\frac{\partial \sigma}{\partial \gamma}$:

$$\frac{\partial \sigma}{\partial \gamma} = \frac{1}{\alpha x} \left[\frac{\frac{\partial(\dot{n} - \gamma n)}{\partial \gamma} n - (\dot{n} - \gamma n) \frac{\partial n}{\partial \gamma}}{n^2} \right] \quad (10)$$

Recall that $\alpha < 0$ and note that the denominator in the bracket of (10) is positive; hence we have to look at the numerator in the big bracket,

$$\frac{\partial(\dot{n} - \gamma n)}{\partial \gamma} n - (\dot{n} - \gamma n) \frac{\partial n}{\partial \gamma} \quad (11)$$

It is easy to show that

$$\dot{n} - \gamma n = -\gamma n_0 + k - \frac{\gamma}{\beta C} t < 0 \quad (12)$$

so that

$$\frac{\partial(\dot{n} - \gamma n)}{\partial \gamma} = -(n_0 + \frac{1}{\beta C} t) < 0 \quad (13)$$

and therefore, the first term of the difference in (11) is negative. Furthermore, in the next proposition we will show that $\frac{\partial n}{\partial \gamma} < 0$; therefore the whole numerator of (10) is negative, which multiplied by $\frac{1}{\alpha}$ makes the whole expression positive. **QED**

From this proposition we can see that, as γ increases the rich become more vulnerable to the taxing power of the city, because their threat of migrating to

the suburbs diminishes. The central city government will take this into account by increasing the tax rate.

The following proposition shows that the increase in taxes is sufficiently high to induce more migration to the suburbs.

Proposition 2. *The higher the quality of public services in the city, the smaller the number of rich who stay in the city.*

Proof/

Formally, we have to show that $\frac{dn}{d\gamma} < 0$. Taking the derivative of n with respect to γ from equation (8), we get the following expression:

$$\frac{dn}{d\gamma} = \frac{1}{\gamma^2} \left[\frac{1}{\beta C} - k \right] \left[\frac{e^{\gamma t}(1 - \gamma t) - 1}{\gamma^2 \beta C} \right] \quad (14)$$

The term $\frac{1}{\gamma^2}$ is positive and the first bracket is positive as well (given our assumption that $k < 0$). If $\gamma t \geq 1$, then it is clear that $\frac{dn}{d\gamma} < 0$. If $0 \leq \gamma t < 1$, then $\frac{dn}{d\gamma} < 0$ is equivalent to the following inequality:

$$e^{\gamma t} < \frac{1}{1 - \gamma t} \quad (15)$$

It can easily be shown that for $0 \leq \gamma t < 1$, this inequality holds. Therefore $\frac{dn}{d\gamma} < 0$.

QED

The intuition for this result is as follows. As the quality of public services in the city improves, the rich become more attached to the central city and hence more vulnerable to the taxing power of the central city government. The central city government will take this into account by increasing the tax rate and the resulting optimal tax turns out to be sufficiently high as to induce more migration to the suburbs despite better quality of public services.

Finally, we analyze the effect of these grants targeted to improve the quality of services in the city on the poor's welfare. We would expect that, as the services improve, the welfare of the poor increases since they are now able to tax the rich more. This is what the next proposition verifies.

Proposition 3. *As the quality of services increases, the welfare of the poor increases as well.*

Proof/

Formally, we have to show that the derivative with respect to γ of the welfare function of the poor, evaluated at the optimal n and σ , is positive.

Specifically, we use the version of the welfare function in (3), evaluated at the optimal n , for both cases, $k = 0$ and $k \neq 0$. Let us write:

$$W(\gamma) = \int_0^T u [y + \beta(\dot{n} - \gamma n)] dt \quad (16)$$

Using Leibniz' Rule, we get

$$W'(\gamma) = \int_0^T u' \cdot \left(\beta \frac{\partial \dot{n}}{\partial \gamma} - \beta n - \beta \gamma \frac{\partial n}{\partial \gamma} \right) dt \quad (17)$$

We have to analyze the expression in parenthesis in the integral of (17). Doing the computations with the result for n found in (8), we get the following expression:

$$\beta \frac{\partial \dot{n}}{\partial \gamma} - \beta n - \beta \gamma \frac{\partial n}{\partial \gamma} = -\beta n_0 - \frac{1}{C}t \quad (18)$$

Substituting into (17) we obtain:

$$W'(\gamma) = - \int_0^T u' \cdot (\beta n_0 + \frac{1}{C}t) dt \quad (19)$$

Since β and C are negative and u' is positive, it follows that $W'(\gamma)$ is positive. **QED**

4. Conclusion

In the last fifty years, there has been a massive shift in the population from the city to the suburbs, especially by middle income and affluent residents. This

has left cities with a small tax base from which to finance their services. Given this trend, a question that has been at the center of political and scholarly debates is: can cities be saved?

This paper has analyzed the effect of federal and state grants specifically targeted to improve the quality of amenities and public services in the city on the flight of the rich to the suburbs. Proponents of these grants argue that improved services financed by the federal government would be a first step towards stopping the flight to the suburbs. Our analysis showed that this is not necessarily the case even if these grants actually go towards improving the amenities in the city. Better quality of services make the rich more vulnerable to the taxing power of the central city government, since the rich become more attached to the city when quality improves. This is taken into account by the city government, and therefore takes the opportunity to increase the taxes on the rich. If the tax increase is sufficiently high, then there is outward migration of the rich, even if improvements in city services are exogenously financed.

Of course, the actual mechanics of the flight to the suburbs are much more complicated than our stylized model can capture. However, our analysis points out to an important factor in trying to tackle the problem of the flight to the suburbs.

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