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Inter-city competition for heterogeneous creative class members using tax policy

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Abstract

We analyze inter-city competition between two cities A and B that use taxes to attract heterogeneous members of the creative class. There are three types of creative class members and each type represents a particular occupation. Irrespective of type or occupation, creative class members value local public goods and each city levies a tax to drawn in as many members of the creative class as possible by providing an apposite local public good. In this setting, we accomplish two tasks. First, we describe the equilibrium allocation, i.e., a tax rate for each city and an allocation of creative class members to the two cities. Second, we compare and contrast this equilibrium allocation with the Pareto efficient allocation.

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1. Introduction

1.1. Preliminaries

In the realm of urban development and economic prosperity, Richard Florida's groundbreaking concept of the *creative class* has been a guiding force for cities aspiring to enhance innovation, economic growth, and cultural vibrancy. Florida first introduced this concept in his seminal 2002 tome, *The Rise of the Creative Class*, where he argued that the key to a city's success lay in attracting and retaining a diverse group of creative individuals.

The creative class, as conceptualized by Florida in the above-mentioned tome and in subsequent work (see Florida 2005, 2008), encompasses a broad range of professionals, including scientists, artists, engineers, designers, and knowledge workers. These individuals share a common feature in their reliance on creativity and innovation in their work. Florida (2002, 2003, 2014) has repeatedly contended that cities that are able to successfully attract and cultivate this creative class will experience heightened economic growth, cultural richness, and overall prosperity.

Florida identifies three critical factors that contribute to a city's ability to attract the creative class, commonly known as the "three Ts" which denote talent, technology, and tolerance. Talent involves the availability of a skilled and diverse workforce. Technology refers to a city's capacity for innovation and access to cutting-edge resources. Tolerance, perhaps the most distinctive aspect of Florida's theory, emphasizes a city's inclusivity and its acceptance of diverse lifestyles, cultures, and ideas.

There is evidence---see Huggins and Clifton (2011), Florida (2014), and Tiruneh (2014)---which shows that the economic impact of the creative class is profound, as these individuals contribute significantly to a city's gross domestic product (GDP) through their innovative endeavors. Moreover, creative class members tend to create a multiplier effect by attracting businesses, investors, and additional talent to a city. As a result, cities that successfully embrace and support the creative class often experience higher levels of economic stability and growth.

1.2. Objectives

Suppose one accepts Florida's contention that cities seeking to prosper economically need to attract members of the creative class. The next question then is: How are cities to do this? Researchers such as Florida (2002, 2008), Buettner and Janeba (2016) and Batabyal *et al.* (2019) have argued that since creative class members in general are interested in locating in cities that provide local public goods (LPGs)[1] such as cultural amenities, quality schools, and public transit, cities can attract creative class members by providing a variety of LPGs.[2]

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1 As noted by Hindriks and Myles (2013, p. 208), a local public good "has the feature that its benefits are restricted to a particular geographical area and it cannot be enjoyed outside of that area."

2 One could argue that cities can also attract creative class members by providing club goods that are excludable but non-rivalrous until the point where continued use causes the use of the club good to become congested. See Hochman (1982), Cornes and Sandler (1996), and van't Veld and Kotchen (2011) for more on this and related points.

How is the provision of LPGs by cities to be financed? One possibility is to use tax policy and there are studies---see Batabyal and Nijkamp (2022) and Batabyal and Yoo (2022)---that have looked into the role that taxes can play in drawing in creative class members to cities. That said, to the best of our knowledge, there are *no* theoretical studies that have analyzed how taxes might be used to attract creative class members to cities when these members are not homogenous but *heterogeneous*. In other words, consistent with what we have noted in section 1.1, we model the point that some members of the creative class are, for instance, artists, others are engineers, and yet others are scientists, and they are *not* all artists or all engineers or all scientists.

Given this lacuna in the literature, in this "preliminary results" paper, we study inter-city competition between two cities A and B that use taxes to attract heterogeneous members of the creative class. Section 2 describes the theoretical framework in which there are three types of creative class members, and each type denotes a particular occupation. Irrespective of type, creative class members value LPGs and each city levies a tax to draw in as many members as possible by providing an apposite LPG. In this setting, we accomplish two tasks. Section 3 describes the equilibrium allocation, i.e., a tax rate for each city and an allocation of creative class members to the two cities. Section 4 compares this equilibrium allocation with the Pareto efficient allocation. Section 5 concludes and then suggests three ways in which the research described in this "preliminary results" paper might be extended.

2. The Theoretical Framework

Consider a static, aggregate economy of two geographically proximate cities denoted by $j = A, B$. Examples of such cities in the United States include Minneapolis and Saint Paul in Minnesota, Buffalo and Rochester in New York, and Dallas and Fort Worth in Texas. The objective of the relevant authority in each city is to attract creative class members to its city by providing a LPG whose provision is financed with taxes.[3]

We study three types of creative class members who have distinct occupations and we denote these three types by $i = 1, 2, 3$. There are $N > 0$ creative class members of each type. The income possessed by a creative class member is denoted by $I > 0$ and this income is, for analytical tractability, independent of her type. To fix ideas, the reader may want to think of type 1 as artists, type 2 denoting engineers, and type 3 representing scientists. That said, it should be noted that our subsequent analysis is independent of the occupational name that is assigned to each one of the three types.

In addition to the LPG which we denote by G, there is a private good in the model which we denote by x. The utility of each type of creative class member depends on her consumption of the LPG (G) and the private good (x). The utility function itself is assumed to be quasi-linear and is given by

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The reader may want to think of our focus on two cities as being representative of scenarios in which only a small number of cities (or regions) possess the conditions to attract the kinds of skilled individuals comprising the creative class. In this regard, note that only a small number of states such as California, New Jersey, New York, and Texas appear to possess the conditions to successfully attract large numbers of immigrant STEM workers who clearly are members of the creative class. Go to https://www.americanimmigrationcouncil.org/research/foreign-born-stem-workers-united-states for more details. Accessed on 2 August 2024.

$$U_i = \beta_i \log\{G\} + x, \quad (1)$$

where β_i is a positive coefficient and $i = 1, 2, 3$. Finally, in our subsequent analysis, without loss of generality, we suppose that $\beta_1 < \beta_2 < \beta_3$. Our next task is to delineate the equilibrium allocation or, put differently, to describe a tax rate for each city and an allocation of creative class members to the two cities under study.

3. The Equilibrium Allocation

Let us denote the taxes levied by the two cities by $\tau_A \geq 0$ and $\tau_B \geq 0$. Also, let the relevant populations in these two cities be denoted by $N_A > 0$ and $N_B > 0$. Now, some thought ought to convince the reader that in our equilibrium allocation, we are looking for a tax rate for each city and an allocation of creative class members to the two cities with the proviso that *no* member would like to change the city to which she has been assigned.

That said, the budget constraint confronting the relevant authority in each of the two cities is given by

$$\tau_A N_A = G_A \; and \; \tau_B N_B = G_B, \quad (2)$$

where G_A (G_B) is the amount of the LPG provided in city A (B). Recall that an allocation is an equilibrium if *no* creative class member wants to move from the city to which she has been assigned. This means that for city A, substituting from (2) into (1), a specific inequality must hold and that inequality is

$$\beta_i \log\{\tau_A N_A\} + I - \tau_A \geq \beta_i \log\{\tau_B(N_B + 1)\} + I - \tau_B. \quad (3)$$

Using the same line of thinking, the corresponding inequality that needs to hold for city B is

$$\beta_i \log\{\tau_B N_B\} + I - \tau_B \geq \beta_i \log\{\tau_A(N_A + 1)\} + I - \tau_A. \quad (4)$$

For any one of the three possible types of creative class members, (3) says that if located in city A then the net utility from residing in city A must be at least as high as the net utility from residing in city B. Similarly, for the same three types of creative class members, (4) tells us that if situated in city B then the net utility from living in city B must be at least as high as the net utility from living in city A. In other words, (3) and (4) are telling us that for any type of creative class member, this member compares the net utility of the *present* allocation with the net utility from *moving* to the other city.

At this point, two points deserve further emphasis. First, the creative class members in our model are of different types and hence they are heterogeneous. But they are heterogeneous in only *one way* and that is in their marginal utilities from the LPG or $\partial U_i / \partial G = \beta_i / G$ for $i = 1, 2, 3$. To keep the subsequent analysis straightforward, these creative class members are not heterogeneous either in terms of their incomes (I is the same for all three types) or in terms of how many of each type there are (N is identical for all three types). If income varied across the three types of creative class members, then I in (3) and (4) would need to be replaced by, for instance, $I_i, i = 1, 2, 3$. Similarly, if the number of members in each type of creative class varied across the three types then N_A (N_B) would now need to be thought of as representing the *sum* of the members of the creative class members of all three types in city A (B).

Second, as explained in section 2, the two cities we are analyzing---such as Minneapolis and Saint Paul in Minnesota---are *geographically proximate* and this is why it makes sense to assume that the mobility costs are very small and hence can be ignored when considering a potential move from one city to the other. If the two cities under study were not geographically proximate, then the attendant mobility costs would need to be modeled explicitly. One simple way to model the mobility costs would be to suppose that they are constant and to then think of income I not as gross income but as net income which equals gross income less the constant cost of potentially moving from one city to the other. That said, if the mobility costs are more complicated because of distance or if they impose externalities then our analysis would need to change substantially.[4]

Given the structure of our model, some thought and analysis reveal that four possible kinds of equilibria arise. In the first kind, both cities A and B levy a tax of *zero* $(\tau_A = \tau_B = 0)$ and all the creative class members are indifferent between residing either in city A or city B. When this happens, the level of the LPG is zero, i.e., the LPG is not provided at all, and no creative class member has any incentive to move from one city to the other.[5]

In the second kind of equilibrium, both cities levy the same *positive* tax $(\tau_A = \tau_B > 0)$. All members of the creative class are situated in the same city and they strictly prefer to be there as opposed to moving to the other city. If a particular creative class member were to move from her current city to the other city, then her tax payment would remain the same but the amount of the LPG provided would decline.

In the third kind of equilibrium, type 1 and type 2 creative class members choose to locate in city A and type 3 creative class members locate in city B. Further, the tax levied by city A is *less* than the tax levied by city B $(\tau_A < \tau_B)$. This is because this tax is directly related to the unit cost of providing the LPG per resident and this cost is *lower* with a larger population in city A. To understand why this situation constitutes an equilibrium, recall our assumption that the positive coefficients of the three utility functions follow the pattern $\beta_1 < \beta_2 < \beta_3$. This third kind of equilibrium corresponds to the situation in which the gap between β_2 and β_1 or $|\beta_2 - \beta_1|$ is small but the gap between β_3 and β_2 or $|\beta_3 - \beta_2|$ is relatively large.

The fourth and final kind of equilibrium is asymmetrically related to the third equilibrium described above. However, the scattering of the creative class members follows a different pattern. Specifically, now type 1 creative class members locate in city A and types 2 and 3 creative class members locate in city B. The tax levied by city A is now *larger* than the tax levied by city B $(\tau_A > \tau_B)$. Once again, this is because this tax is directly related to the unit cost of providing

4 See Hanushek *et al*. (2004), Cebula (2007), and Saltz and Capener (2016) for discussions of alternate scenarios where mobility costs materially influence the decision to move from one location to another. See Rhode and Strumpf (2003) and Kessler and Lulfesmann (2005) for informative analyses of Tiebout models with heterogeneous population mobility.

5 The reader should not interpret our "LPG is zero" description literally because the logarithm of zero is undefined.

the LPG per resident and this cost is *lower* with a larger population in city B. Like in the third equilibrium, this equilibrium corresponds to the situation in which the gap between β_3 and β_2 or $|\beta_3 - \beta_2|$ is small but the gap between β_2 and β_1 or $|\beta_2 - \beta_1|$ is relatively large.

Some thought ought to convince the reader that given the structure of our model, it is not possible to have an equilibrium in which type 2 creative class members are divided between the two cities A and B. Similarly, it is also not possible for an equilibrium to exist in which types 1 and 3 creative class members locate in one city and type 2 creative class members locate in the other city. Our next and last task is to compare the equilibrium allocation of this section with the Pareto efficient allocation.

4. Pareto Efficient Allocation

We begin by noting that an equilibrium is Pareto efficient when no change in either the tax rates or the location of the creative class members can increase the welfare of a creative class member without reducing the welfare of another creative class member. So, to assess whether a scenario is an equilibrium, we move a single creative class member from one city to the other and then study her payoff while keeping the two tax rates *fixed*. On the other hand, to assess Pareto efficiency, we need to test against *any* reallocation of the creative class population and *any* variation in the two tax rates.

In our model, the nature of the Pareto efficient allocations can be understood by recognizing that there are two competing forces at work. We refer to these two forces as the *agglomeration* and the *heterogeneity* effects. On the one hand, an agglomeration of the entire creative class population in a single city raises the quantity of the LPG for a given tax rate (see (2)). On the other hand, having the entire creative class population locate in one city forces a single tax rate onto a heterogeneous population. Therefore, the makeup of the Pareto efficient allocations is determined by which of these two competing effects is the strongest.

Consider the simplest case in which $\beta_1 = \beta_2 = \beta_3$. In this case, there is no heterogeneity effect and only the agglomeration effect applies. Therefore, it is Pareto efficient to have the entire creative class population locate in a single city with the tax rate set at the level that maximizes the utility of the creative class members. Now, by using the mathematical notion of continuity, we infer that when β_1 is close to β_3, the entire creative class population is located in one city and the tax rate lies anywhere between the rate preferred by the type 1 and the type 3 creative class members.

When β_1 is sufficiently different from β_3, the heterogeneity effect matters more than the agglomeration effect and therefore the creative class population needs to be split up between the two cities A and B. Further, if β_2 is close to β_1 then creative class members of types 1 and 2 ought to be situated together in the same city with the tax rate lying anywhere between the rates preferred by the type 1 and the type 2 creative class members. Type 3 creative class members, on the other hand, should be situated in the other city and these members ought to face their preferred tax rate. Finally, if β_2 is close to β_3 then the creative class members of types 2 and 3 ought to be located together in one city, facing a tax rate that lies between the tax rates preferred by the type

2 and type 3 creative class members. In addition, type 1 creative class members ought to be situated in the other city and these members ought to face their preferred tax rate.

Which of the four possible kinds of equilibria discussed in section 3 are also Pareto efficient? We now answer this question. The first kind of equilibrium in which there is no LPG provided in either city and where both city taxes are zero strongly favors the *status quo* and hence this kind of equilibrium is trivially Pareto efficient. The second kind of equilibrium gives us an *extreme* result in which all types of creative class members are located in the same city even though these types are *heterogeneous*. Because of the general presence of both agglomeration and heterogeneity effects, this kind of equilibrium is not Pareto efficient. The third and the fourth kinds of equilibria reflect scenarios in which the agglomeration and the heterogeneity effects are *both* at work simultaneously. Recall, for instance, that in the third kind of equilibrium, type 1 and type 2 creative class members choose to locate in city A, which reflects the agglomeration effect, and type 3 creative class members locate in city B, which reflects the heterogeneity effect. As such, both these kinds of equilibria are Pareto efficient. This completes our discussion of inter-city competition for heterogeneous creative class members using tax policy.

5. Conclusions

In this "preliminary results" paper, we studied inter-city competition between two cities A and B that used taxes to attract heterogeneous members of the creative class. There were three types of creative class members and each type represented a specific occupation. Irrespective of the type or occupation, creative class members valued LPGs and each city levied a tax to attract as many members as possible by providing a suitable LPG. In this setting, we carried out two tasks. First, we described the equilibrium allocation, i.e., a tax rate for each city and an allocation of creative class members to the two cities. Second, we compared this equilibrium allocation with the Pareto efficient allocation.

It is possible to extend our analysis in several directions. In what follows, we suggest three possible extensions. First, it would be useful to generalize the analysis here by seeing how the inclusion of, for instance, differential labor productivities of the individual types of creative class members and the phenomenon of congestion affect the taxation decisions of the two cities. Second, it would be helpful to study a scenario in which the decision to attract creative class members to cities by means of taxation must also account for the presence of a human capital externality. Finally, it would be instructive to analyze the interaction between creative class members and city authorities when the aggregate economy under consideration consists of three or more cities. This would permit a researcher to use insights from the economics of networks---see Jackson (2008)---to analyze the interactions between the three or more cities in interesting ways. Studies that analyze these facets of the underlying problem will provide further insights into the nature of the dealings between potentially mobile creative class members and city authorities that would like to attract these members to their respective cities.

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