Migration in Search of Good Government

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Abstract

Residents both enjoy the policies adopted in their cities, and choose those policies. If some people can better evaluate policies than can others, then the most perceptive people will be the most willing to move to the city with better policies, thereby making that city more likely to adopt good policies in the future. Such migration can cause agglomeration, with some cities prospering and others failing.

1 Introduction

Some cities grow and prosper; others shrink. Some regions see increasing concentrations of high-technology industries; other regions see their industries flee. Common explanations for different fortunes of cities are differences in geographical features, economies of agglomeration, and related network effects. In this paper we focus on a fourth explanation, the adoption of different policies by governments in different regions: some are good, while some are bad. We differ from other work in two ways. First, we allow policies to differ in quality not for exogenous reasons, but because residents and voters differ in their ability to evaluate policies and to identify good candidates or policies. Second, we allow for migration of voters, with the most perceptive people the most willing to move to regions or cities which will likely adopt good policies. This migration, affecting the composition of voters, can in turn affect the policies adopted in each city. The combination of these two effects can lead to snowball effects—once a city adopts good policies which encourage growth, it becomes increasingly likely to adopt good policies.

To elaborate, consider two cities, each with an incumbent mayor. One mayor is better than the other, say in building infrastructure more efficiently, choosing better infrastructure projects, and so on. Perceptive residents of one city may move to the city with the better policy. They do so for two reasons. First, they want to benefit from the better policy. Second, they want to live in the city which will choose better policies in the future. In the next period, or in the next election, the city with the larger proportion of perceptive voters will also choose a better mayor. Therefore, in the next period, the city which increased its fraction of perceptive voters will do even better. We may then have net migration to one city over another, leading to continued growth. This may look like economies of agglomeration, but is not.

Historical examples of people migrating for political reasons are common. The Pilgrims left England for the United States to escape religious persecution. During the American Revolutionary War, loyalists migrated to Canada, changing the political complexions of both Canada and of the United States. Some of these migrations arise because a minority has different policy preferences from the majority. But migration can also arise from differences in beliefs about the quality of policy.

Recent work stresses the importance of a city's composition. In particular, Florida (2002, 2005) argues that the success of local economies depends largely on the presence of a "creative class," and that to develop their economies cities must adopt policies that attract such people. Some leaders have reacted accordingly. The city of Providence, Rhode Island is so worried that it appeals little to hip, young, technology workers that local economic-development officials are urging a campaign to make the city the nation's capital of independent rock music. Pittsburgh officials want to build bike paths and outdoor hiking trails to make the city a magnet for creative workers. A Memphis economic-development group is pressing for "celebrations of diversity" to attract more gays and minorities.[1] These analyses do not recognize, however, that a city is more likely to know how to attract members of the creative class the greater the number of its residents who themselves belong to the creative class. Our analysis allows for consideration of such effects.

2 Literature

2.1 Agglomeration in cities

Since a central feature of cities is agglomeration, a large literature examines its benefits, both in consumption and in production. When economies of scale in production limit the number of varieties of a good produced, an increase in the number of consumers who prefer some class of goods can generate a consumption externality.[2] People who want to consume a wide variety of goods may therefore prefer living in large cities. This cause of agglomeration has been analyzed theoretically and verified empirically.[3] The taste for diversity can generate economic growth in a city and the formation of a large city (see de Groot and Nahuis (1998) and Ogawa (1998) for theoretical analyses). Such agglomeration, as Tabuchi (1998) shows through numerical simulations of a general equilibrium model, can improve welfare. The desire

[1]See Steven Malanga "The Curse of the Creative Class: A New Age theory of urban development amounts to economic snake oil." http://www.opinionjournal.com/extra/?id=110004573.

[2]For nice evidence on this effect, see George and Waldfogel (2000), who find that per capita readership of newspapers by whites increases with the number of whites in a market, and that readership by blacks increases with the number of blacks in a market.

[3]For a survey of theoretical and empirical work on urban agglomeration, see Quigley (1998).

by consumers to avoid excessive transportation costs when buying a wide variety of goods can also affect the spatial structure within a city (Stahl (1983), Fujita (1988), and Rivera-Batiz (1988)).

2.2 Migration

Understanding agglomeration requires understanding migration—under what conditions will people move to a larger city. Any discussion of migration of course builds on the classic analysis by Tiebout (1956), who argues that people will move to communities consisting of people similar to themselves, and so who prefer the same types and quantities of local public goods. This effect can limit the size of cities: the greater variety of private goods in a large city may be counteracted by the smaller variety of local public goods when much of the population lives in a few large cities.

The incentives of politicians to induce migration are studied by Glaeser and Shleifer (2002). They discuss Mayor Curley of Boston, who used wasteful redistribution to his poor Irish constituents and incendiary rhetoric to encourage richer citizens to emigrate from Boston, thereby shaping the electorate in his favor. Curley won elections, but Boston stagnated.

Relatedly, Hansen and Kessler (2001) study how mobility and taxation interact. Their model explains why tax rates are lower in small countries than in large ones. People differ in their incomes, and migration arises from self-selection. In their model, the political equilibrium has rich people voting for low taxes and low grants; poor people vote for high taxes and high grants.

The Curley effect, and the effects of taxes on migration, however, can be weak when land prices reflect local policies. The effects of taxes on property values and on migration are studied by Epple and Romer (1991). They show that though local redistribution induces sorting of the population, the induced changes in property values make redistribution feasible.

2.3 Quality of politicians

The studies referred to suppose that people have heterogeneous preferences—rich people prefer to live where other rich people do. Migration and agglomeration can also occur when preferences are homogeneous, but information is not. In particular, some voters may know more about the quality of politicians in different cities.

The quality of politicians is studied by Carrillo and Mariotti (2001) and Caselli and Morelli (2001). They focus on the incentives of politicians, but do not consider the ability of voters to evaluate politicians or policies. Besley and Coate (1997, 1998) argue that low-quality candidates can be elected if those voters who share their preferences cannot concentrate their votes on a higher-quality candidate, either because of coordination failures (band-wagon effect), or because preferences and ability are perfectly correlated.

The snowball effects we shall consider will be strengthened if the civic culture in a city reflects the identity of its past residents: the higher the quality of past residents, the better its procedures and traditions, and so the more successful it will be in the future. This relates to work on corporate cultures.[4]

3 Assumptions

We consider two jurisdictions (or cities), A and B, indexed by j. Each person lives for two years; a person is young in year 1 of his life, and old in year 2 of his life; generations overlap. We divide each year into two sub-periods. A person is born in the first half of a year; in that half year he votes (as do the elderly) on a policy in his city. The policy can be either good or bad. The results of the policy are realized in the second half of each year. A resident in a city prefers a good policy over a bad policy. A good policy adopted in the first half of a year generates positive benefits G to each of its residents in the second half of that year; a bad policy generates zero benefits. At a fixed cost of c a young person can move between the time he votes and the time the policy is realized. An old person votes in the first half of his second year, cannot move after voting, and realizes the benefits of the policy in the second half of his second year. A resident can be either perceptive (an H-type) or not (an L-type); the type is fixed over a person's life. An H-type person differs from an L-type person in two ways. First, as described below, a city likely adopts a good policy the greater the fraction of the residents who are

[4] Snowball effects arising from culture have been studied in corporations. If corporate culture is embodied in the firm's workers (Jovanovic (1979) and Prescott and Visscher (1980),suppose), then as Arrow (1974) shows, a firm's culture can be path dependent, and culture can vary across firms.

H-types.[5] More specifically, let the ratio of H-types to L-types in city j in year t be x_t^j. Then the city adopts a good policy with probability $f(x_t^j)$, where $f' > 0$. An uninformed resident's estimates as $f(x_t^j)$ the probability that the city adopted a good policy.

Second, an H-type is more likely than is an L-type to know whether a city has a good or a bad policy. More specifically, with probability π_H an H-type knows the quality of the policy adopted by both cities in the current period; with probability $\pi_L < \pi_H$ an L-type resident has such perfect information. With probability $1 - \pi_H$ an H-type has no direct information about the quality of policy adopted in that period. He does, however, know the fraction of residents in each city who are H-types. An L-type person also knows this fraction.

A young person moves from one city to another if that would increase his expected future utility. Of course, a person's benefit from moving is higher if the other city has a better policy, or is expected to adopt a better policy in the future.

The benefits arising in the following year are discounted by δ. The utility of a person living in city k in the first half of year t and who does not move is $E(f(x_t^k))G + \delta E(f(x_{t+1}^k))G$. The utility of a person living in city k in the first half of year t and who moves to city j is $-c + E(f(x_t^j))G + \delta E(f(x_{t+1}^j))G$. A person can achieve higher utility if he knows the quality of policies adopted in the two cities in year $t+1$. If he does not know, his utility is as described above. In contrast, if he does know the policy in the other city, then in the above expression substitute G or 0 for $E(f(x_t^k))G$ and $E(f(x_t^j))G$.

To simplify the analysis and to highlight the effects of migration, we want births and deaths to leave the composition of a city unchanged. We therefore assume that a new-born inherits the type of a random old person in that city.[6] Many of the assumptions are depicted in Figure 1, which shows residents in the two cities, migration decisions, and policy choices.

[5] The relation may occur because of voting (with H-types more likely to vote for a good official or for a good policy), because H-types residents can lobby government for good policies, because H-types residents can provide useful information to policymakers, and so on.

[6] A more general assumption would have inheritance reflect a weighted average of the characteristics of the previous two generations. The snowball effect we analyze below would then be strengthened.

4 Migration

We begin our analysis by determining the utility-maximizing behavior of an individual—whether to migrate from one city to another. An individual's decision depends on his expectations of future policy in each city. But since policy depends on the composition of a city's residents, an individual's expectations about policy depend on his expectations about migration by other individuals. That requires considering equilibrium behavior, which we do later.

4.1 An individual's decision

In considering an individual's decision, three cases must be examined: city A has the better policy, city B has the better policy, or the two cities have the same policy. For simplicity, we assume that π_L is zero and denote π_H simply as π; that is, $0 = \pi_L < \pi_H = \pi$. We suppose, without loss of generality, that x_t^A is at least as large as x_t^B. Suppose for the moment that each person expects no uninformed H-type to move.

4.1.1 Migration by an L-type

Recall that a fraction π of H-types know that city A has the better policy, that a fraction $1-\pi$ of H-types do not, and that no L-type knows which city has the better policy. Recall also that $f(x_{t+1}^j)$, the probability that policy will be good in city j in period $t+1$, depends on migration in period t, which in turn depends on the policies in the cities. Also recall that an L-type does not know which city has the better policy, and so is unsure about migration by H-types. He does form expectations, with $E(f(x_{t+1}^j))$ his estimate of the probability that city j will have a good policy in period $t+1$. Call l_t the number of L-types who move from city B to city A in year t (with the move occurring between the first half and the second half of the year). Then x_{t+1}^A denotes $\frac{H_t^A}{L_t^A+l_t}$, and x_{t+1}^B denotes $\frac{H_t^B}{L_t^B-l_t}$.

If each person believes that an informed H-type moves to the city with the better policy then

$$E(f(x_{t+1}^A)) = f(x_t^A)(1-f(x_t^B))f\left(\frac{H_t^A+\pi H_t^B}{L_t^A+l_t}\right)$$

$$+(1-f(x_t^A))f(x_t^B)f\Big(\frac{H_t^A-\pi H_t^A}{L_t^A+l_t}\Big)$$

$$+(f(x_t^A)f(x_t^B)+(1-f(x_t^A))(1-f(x_t^B)))f\Big(\frac{H_t^A}{L_t^A+l_t}\Big), \tag{1}$$

$$E(f(x_{t+1}^B)) = f(x_t^A)(1-f(x_t^B))f\Big(\frac{H_t^B-\pi H_t^B}{L_t^B-l_t}\Big)$$

$$+(1-f(x_t^A))f(x_t^B)f\Big(\frac{H_t^B+\pi H_t^A}{L_t^B-l_t}\Big)$$

$$+(f(x_t^A)f(x_t^B)+(1-f(x_t^A))(1-f(x_t^B)))f\Big(\frac{H_t^B}{L_t^B-l_t}\Big). \tag{2}$$

If each person believes that an informed H-type in city B will move to city A when city A adopts a good policy and city B adopts a bad policy, whereas an informed H-type in city A will stay when city A adopts a bad policy and city B adopts good policy, then

$$E(f(x_{t+1}^A)) = f(x_t^A)(1-f(x_t^B))f\Big(\frac{H_t^A+\pi H_t^B}{L_t^A+l_t}\Big)$$

$$+(1-f(x_t^A)(1-f(x_t^B)))f\Big(\frac{H_t^A}{L_t^A+l_t}\Big), \tag{3}$$

$$E(f(x_{t+1}^B)) = f(x_t^A)(1-f(x_t^B))f\Big(\frac{H_t^B-\pi H_t^B}{L_t^B-l_t}\Big)$$

$$+(1-f(x_t^A)(1-f(x_t^B)))f\Big(\frac{H_t^B}{L_t^B-l_t}\Big). \tag{4}$$

The condition under which an L-type in city A will stay in city A is

$$f(x_t^A)G+\delta E(f(x_{t+1}^A))G > -c+f(x_t^B)G+\delta E(f(x_{t+1}^B))G. \tag{5}$$

An L-type in city B will stay there if

$$-c+f(x_t^A)G+\delta E(f(x_{t+1}^A))G \le f(x_t^B)G+\delta E(f(x_{t+1}^B))G \tag{6}$$

when $l_t = 0$. Otherwise, an L-type in city B will move to city A up to the point where

$$-c+f(x_t^A)G+\delta E(f(x_{t+1}^A))G = f(x_t^B)G+\delta E(f(x_{t+1}^B))G. \tag{7}$$

If (6) holds with $l_t = 0$, then from (1) and (2), or from (3) and (4), we can see that $E(f(x^A_{t+1})) > E(f(x^B_{t+1}))$, and thus that (5) necessarily holds. Also when (7) holds, (5) necessarily holds. Thus, in any case, (5) holds. Therefore, we can see that an L-type in the city with large x_t will never move.

Whether an L-type in the city with smaller x_t moves depends on the difference in x_t between the cities. If x^A_t is not sufficiently larger than x^B_t, then (6) holds. Though an L-type in city B can expect better policy in city A, he cannot expect the quality to be so high as to compensate for the cost of moving. Only if the gap in x_t is sufficiently large to satisfy (7) will an L-type in city B move to city A.

Note that the beliefs of an L-type about the behavior of H-types should be consistent with the behavior of an informed H-types who expects l_t to satisfy (5)-(7) with $E(f(x^j_{t+1}))$ under that belief. Because, as will be seen below, an informed H-type in city B will move to city A when city A adopts a better policy, either a pair of (1) and (2) or a pair of (3) and (4) is necessarily satisfied.

4.1.2 Migration by an H-type

With the behavior of L-types analyzed, we turn to the migration of H-types.

City A has better policy Suppose first that in period t city A adopts a good policy and city B adopts a bad policy. An informed H-type who knows the qualities of policies can perfectly predict x^j_{t+1} and thus $f(x^j_{t+1})$. An informed H-type in the city with the better policy can enjoy the benefits of that policy by staying in that city, and will not move to the city with the inferior policy. That is, it necessarily follows that

$$G + \delta f(x^A_{t+1})G > -c + 0 + \delta f(x^B_{t+1})G, \tag{8}$$

and thus an informed H-type in city A has no incentive to move.

When city A has a better policy than city B, and has a higher value of x_t, any one informed H-type in city B will move to city A if

$$-c + G + \delta f(x^A_{t+1})G > 0 + \delta f(x^B_{t+1})G. \tag{9}$$

From the discussion above, an H-type in city A will necessarily stay in that city; the number of H-types in city A will not decline. Therefore, if l_t, the flow of L-types into city A, is sufficiently small, in period $t+1$ city A will be increasingly likely to adopt a good policy. In this case, (9) can hold and informed H-types in city B will move to city A.

When (6) holds and so $l_t = 0$, equation (9) is satisfied. That is, if the gap in x_t^j is not sufficiently large to induce L-types in city B to move, city A maintains its higher probability of adopting a good policy, and thus H-types in city B will move to city A.

Also when (7) holds, (9) is satisfied: the number of L-types who move from city B to city A cannot be so large as to change the rank order of x_t^j.

Therefore, we see that in any case (9) is satisfied and an informed H-type in city B will necessarily move to city A. An informed H-type will be attracted by both the higher utility realized in the current period, and by the higher utility expected in the next period in city A.

City B has better policy Suppose next that city B has the better policy. An informed H-type in city B has no incentive to move, whereas any one informed H-type in city A has an incentive to move if

$$0 + \delta f(x_{t+1}^A)G < -c + G + \delta f(x_{t+1}^B)G, \tag{10}$$

where x_{t+1}^A denotes $\frac{H_t^A}{L_t^A + l_t}$, and x_{t+1}^B denotes $\frac{H_t^B}{L_t^B - l_t}$.

Note that the condition (10) is less stringent than (9). Migration from city A to city B can be limited when people expect city B to have few H-types, leading to bad policy in city B in the following year.

Cities have identical policies Lastly, in any one period, the two cities may have the same policy, namely both have good policies or both have bad policies.

Suppose first that both cities adopted bad policies. Then one equilibrium is for no one to move. But might some rational H-types move, say from city B to city A? If some H-types did move, then in the following year city A would have a larger fraction of H-types than would city B, and so in the year after that city A would adopt a good policy with higher probability than would city B. That makes it attractive for an H-type to move. But it also makes it attractive for an L-type to move. Therefore, rational behavior cannot have only H-types move. Either no residents move, or all residents from B move to A; then none is made better off, but each incurs a moving cost. Indeed, an H-type would then prefer to remain in city B, for city B would have a higher fraction of perceptive residents in year 2. Thus, rational expectations imply that no one moves.

If both cities adopted good policies, then the analysis is the same as when both adopted bad policies.

4.2 Equilibrium behavior

The migration patterns fall into four cases, depending on which of (1)-(10) the x_t^A and x_t^B satisfy. As before, we call city A the one with the higher value of x_t. The four cases are:

- Case 1: Equation (6) holds with $l_t = 0$, (9) holds, and (10) holds. If cities adopt different policies, then informed H-types in the city with the bad policy move to the city with the good policy.

- Case 2: Equation (6) holds with $l_t = 0$, condition (9) holds, and (10) does not hold. Then an informed H-type in the city with a bad policy moves to the city with the good policy only if that is city A.

- Case 3: Equation (6) does not hold, (9) holds, and (10) holds. Some L-types in city B move to city A up to the point where (7) holds. An informed H-type in the city with the bad policy would move to the city with the good policy.

- Case 4: Equation (6) does not hold, (9) holds, and (10) does not hold. Some L-types in city B move to city A up to the point where (7) holds. An informed H-type in the city with a bad policy moves to the city with the good policy only if that is city A.

Figure 2 shows the areas in which each of the four cases holds . The horizontal axis measures the distribution of L-types between the cities. The distance from the left is the number of L-types in city A; the distance from the right is the number of L-types in city B. The vertical axis measures the distribution of H-types between the cities. The distance from the origin is the number of H-types in city A. Points above the 45 degree line show distributions of residents in which city A has a higher proportion of H-types than does city B. For any point Q in the figure, the slope of line OQ is x_t^A.

Curve HH shows combinations of x_t^A and x_t^B which make an H-type indifferent about moving from city A to city B when city B has a better policy; it is derived from (10), with an equality replacing the inequality. In the area above curve HH, no informed H-type in city A moves to city B, even if city B adopts a better policy. The larger the migration cost c, the less willing is an H-type in city A to move to city B, and thus the larger is the area above HH.

Curve LL shows combinations of x_t^A and x_t^B which make an L-type indifferent about moving moving from city B to city A; it is derived from (6) when it has an equality. At any distribution above this curve, some L-types will move from city A to city B. Recall, however, that the behavior of an L-type depends on his expectations on what H-types will do, in particular on whether an H-type will move from city A to city B when city B has the better policy. That in turn means that we must separately consider behavior when curve HH lies above curve LL) (so that an L-type may move to city A even when he expects that H-types may move to city B), and when curve HH lies below curve LL (so that an L-type who moves to city A expects that no H-type will ever move to city B).

If the migration cost c is small, curve HH lies above curve LL, as in Figure 2(a).[7] In contrast, if c is large, curve LL lies above curve HH, as in Figures 2(b) and (c). The different areas in the figures depict the four cases discussed above.

Case 1 The area below curves HH and LL shows case 1 (H-types move to whichever city has the better policy). Since x_t^A is not very large, the expected quality of policy in city A is not sufficiently large to compensate for the migration costs. H-types, however, may move to the city with the better policy, so that the distribution can move vertically up or vertically down, but not horizontally. The further is the distribution point from the 45 degree line, the more it tends to depart from it: the larger is the gap in x_t^j between cities, the greater is the relative probability that the city with the larger x_t will adopt the better policy. Therefore, the distribution point will infrequently cross the 45 degree line once it departs from it, but it may stay in the area of case 1 for long periods, moving up and down in it.

[7] As an extreme case, if $c = 0$ curve HH becomes the horizontal line at the top of the box; curve LL coincides with the 45^0 lines.

Case 2 Curve LL lies above curve HH, as in Figures 2(b) and 2(c). The enclosed area then shows case 2.[8] The gap in the expected policy quality in the next period $f(x_{t+1}^j)G$ is sufficiently large for an informed H-type to stay in the city with higher x^t despite the other city having a better policy. The gap in x_t^j is not, however, sufficiently large to induce an L-type in the city with smaller x_t^j to move. Thus, in the area of case 2, a change can never be to the left or to the right; and a change can never be straight down. The only change can be straight up. In distinction to the case with small migration costs, no counterforce prevents the gap in x_t^j from expanding. When the city with larger x_t^j adopts a good policy, it attracts H-types. But the city with larger x^t does not attract L-types, and so does not suffer from a decline in the quality of its voters. In contrast, even if the city with smaller x_t^j happens to adopt the better policy, it attracts no H-type. Therefore, the gap between the x_t^j's continues to grow.

Case 3 Curve HH lies above curve LL, as in Figure 2(a) . The area enclosed by these curves shows case 3: (H-types move to the city with the better policy, and some L-types move to city A). [9] H-types may move to the city with the better policy, and L-types may move to the city with more H-types. Thus, in the area of case 3, a change can be to any direction other than to the left. The migration of L-types cannot reverse the rank order of x^j, but it can prevent the gap in x^j from becoming tremendously large, and thus can help the city with smaller x_t maintain a positive probability of adopting the better policy and of attracting H-types. Thus, from a point in this area, the distribution point can then cross the 45 degree line, though infrequently.

[8]In drawing LL, we calculate combinations of the numbers of L-types and H-types in each city which bind (6) with $l_t = 0$. Note that $E(f(x_{t+1}^j))$ in (6) is not (1) and (2) but (3) and (4). In drawing HH, we calculate combinations of of the numbers of L-types and H-types in each city which bind (10) with $l_t = 0$. We must then check whether LL lies above HH.

[9]In drawing HH, we must calculate the value of l_t and H_t which simultaneously satisfy (7) and (10) for a given L_t. Note that $E(f(x_{t+1}^j))$ in (7) is not (3) and (4), but instead (1) and (2). In drawing LL, we calculate combinations of the numbers of L-types and H-types in each city which bind (6) with $l_t = 0$. Again, note that $E(f(x_{t+1}^j))$ in (7) is not (3) and (4) but (1) and (2). Then we must check that such HH lies above LL.

Case 4 The area above curves HH and LL shows case 4 (H-types and L-types may move to city A but not to city B). In this area, x_t^A is sufficiently large so that no one in city A will incur the migration cost c of moving to city B, even if city B adopts a better policy. But H-types and L-types in city B may move to city A, expecting city A's better policy, and change the distribution up and to the right.. Thus, in the long run, all H-types agglomerate in city A, and more than half, but not all, of L-types reside there.

4.2.1 Dynamics

The dynamics, or the time path of x_t^A and of x_t^B, are stochastic, depending on the realization of policy in each of the two cities. But to give the flavor of the dynamics, we numerically simulate the paths. We shall separately consider cities which are initially identical in the composition of their populations, and cities which differ.

4.2.2 Initially identical cities

Simulation results with initially identical cities are shown by the solid lines with dots in Figures 2(a), 2(b), and 2(c). In Figures 2(b) and 2(c), the distribution of residents steadily approaches the steady-state solutions; Figure 2(a) instead shows cycling. The vertical segment lying above the initial distribution on the 45 degree line means that at first only H-types move; only after some time do L-types move, generating the horizontal segments in the figures. When migration costs are low, as in Figure 2(a), the city which initially has the better policy enjoys a persistent (but not permanent) advantage of a high proportion of H-types, and so a high probability of adopting the better policy. When migration costs are high, as in Figures 2(b) or 2(c), the city with the initially better policy permanently enjoys a better policy.[10]

People migrate because a city which happens to adopt a better policy attracts informed H-types from the other city. Thus, in the next period, the city with more H-types is more likely to adopt a better policy in the next

[10]For these simulations, $\pi_H = 0.2$, $\delta = 0.9$, and $G = 1$. The migration cost, c, is 0.6 in Figures 2(a) and 3(a); the migration cost is 0.75 in Figures 2(b), 2(c), 3(b), and 3(c). The function giving the probability policy is good, $f(x)$, is $(0.1 + x)/(1 + x)$ in Figures 2(a), 2(b), 3(a), and 3(b). The function is $f(x) = (0.4 + x)/(1 + x)$ in Figures 2(c) and 3(c).

period, will attract yet more H-types, and so further increase the expected quality of its policies. With positive probability, however, the city with the smaller x_t will adopt the better policy, and so with positive probability will attract H-types. L-types migrate after H-types have. It also mitigates the increased gap in x_t between cities. When c is large, L-types migrate only after H-types do. Such migration by L-types cannot, however, reduce the gap in x_t^j to such an extent that the city with smaller x_t^j can attract H-types even when it adopts the better policy.

We show typical simulation results in a different way in figures 3(a)-3(c). The horizontal axis measures time; the vertical axis measures x_t^A, or the ratio of H-types to L-types in city A. Figure 3(a) shows three different simulations, with the migration cost set to a high value. We see that for long periods one city or the other has a higher proportion of H-types, but that given sufficient time a city will lose its advantage to another city. In contrast, when migration costs are large, one city eventually gains the advantage in having more H-types, and maintains that advantage (see Figures 3(b) and 3(c)).

The analysis can be extended to consider multiple cities. An equilibrium can then have configurations of cities. One configuration has both H-types and L-types. The other type has only L-types. The mixed cities need not necessarily have the identical distributions of residents: one city may have a larger fraction of H-types than another city, but the moving costs may be sufficiently high to prevent migration.

4.2.3 Initially different cities

Consider next cities which initially differ in the compositions of their populations. We shall see that an equilibrium can have all H-types live in city A, some L-types in city A, and some L-types in city B. Denoting equilibrium outcomes by e, we will show that $x_e^A > 0$, and that $x_e^B = 0$.

When $x_t^A > 0$ and $x_t^B = 0$, (3) and (4) become

$$E(f(x_{t+1}^A)) = f\left(\frac{H_t^A}{L_t^A + l_t}\right), \tag{11}$$

$$E(f(x_{t+1}^B)) = f(0). \tag{12}$$

With these equations and $l_t = 0$, (6) can be written as

$$-c + f(x_t^A)G + \delta f(x_t^A)G \leq f(0)G + \delta f(0)G. \tag{13}$$

Therefore, if an L-type believes that no informed H-type in city A will move to city B even if city B has the better policy, and if (13) holds, no L-type will move to city A. Let x^A_{MAX} be the value of x^A_t which satisfies equation (7) with $l_t = 0$ and $H^B_t = 0$:

$$-c + f(x^A_{MAX})G + \delta f(x^A_{MAX})G = f(0)G + \delta f(0)G. \tag{14}$$

Obviously, this x^A_{MAX} is the maximum x^A_t which satisfies (13). When c is large, curve LL can intersect the line $H^A = 1$, as in Figure 2(c). The value of x^A_{MAX} is the slope of the line from O to the intersection of $H^A = 1$ and curve LL. For the beliefs of L-types about the behavior of H-types to be consistent, (10) should not be satisfied,

$$0 + \delta f(x^A_{MAX})G > -c + G + \delta f(0)G. \tag{15}$$

Combining these two yields the condition for an equilibrium as

$$c > (G/2)(1 + f(x^A_{MAX}) - f(0)). \tag{16}$$

Any combination of $x^B_e = 0$ and x^A_e which satisfies $x^A_e \leq x^A_{MAX}$ can be an equilibrium: no L-type will move from city B to city A and no H-type will move from city A to city B even if city B has the better policy. Therefore, if initially $x^B_t = 0$ and $x^A_t \leq x^A_{MAX}$, then no one migrates, and these x^j_t repeat perpetually. If initially $x^B_t = 0$ and $x^A_{MAX} < x^A_t$, some L-types move from city B to city A. But no one will move from city A to city B, so that x^A_t decreases and approaches x^A_{MAX}.

5 Industry effects

We so far spoke of migration due solely to differences in public policy between the cities. But similar effects can appear with technology or other shocks. Suppose city A enjoys a positive technology shock. H-types people better realize it, and so move to A. The increased number of H-types in city A then makes it more likely to adopt good policies, creating a snowball effect.

And similar effects can appear within industries, explaining industry decline.[11] H-type workers recognize that the industry will decline, offering few opportunities in the future. H-type workers therefore leave the industry. The shortage of H-types then accelerates the decline of the industry.

[11] For a different explanation, see Cassing and Hillman (1986).

6 Conclusion

The economics literature has long recognized that people will migrate to jurisdictions with policies they prefer. It has also recognized that the identity of residents determines the policies cities will adopt. In other branches of literature, for example in studies of education and in studies of job matching in the labor market, economists also explore the equilibria which arise when people differ in ability. But we do not know of work which examines equilibria when people differ in their knowledge of what policies a government pursues. We think that such an examination can explain interesting phenomena. Migration coupled with endogenous policy can lead some cities to grow while others decline, in a patten that may look like that which arises from economies of agglomeration, but which has nothing to do with it.

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7 Notation

c Cost of moving

G Gain to a resident from a good policy

l_t Number of L-types who move from city B to city A in period t

x_t^j Ratio of H-types to L-types in city j in period t

δ Intertemporal discount rate

π_i Probability that a type-i person knows the quality of policy adopted

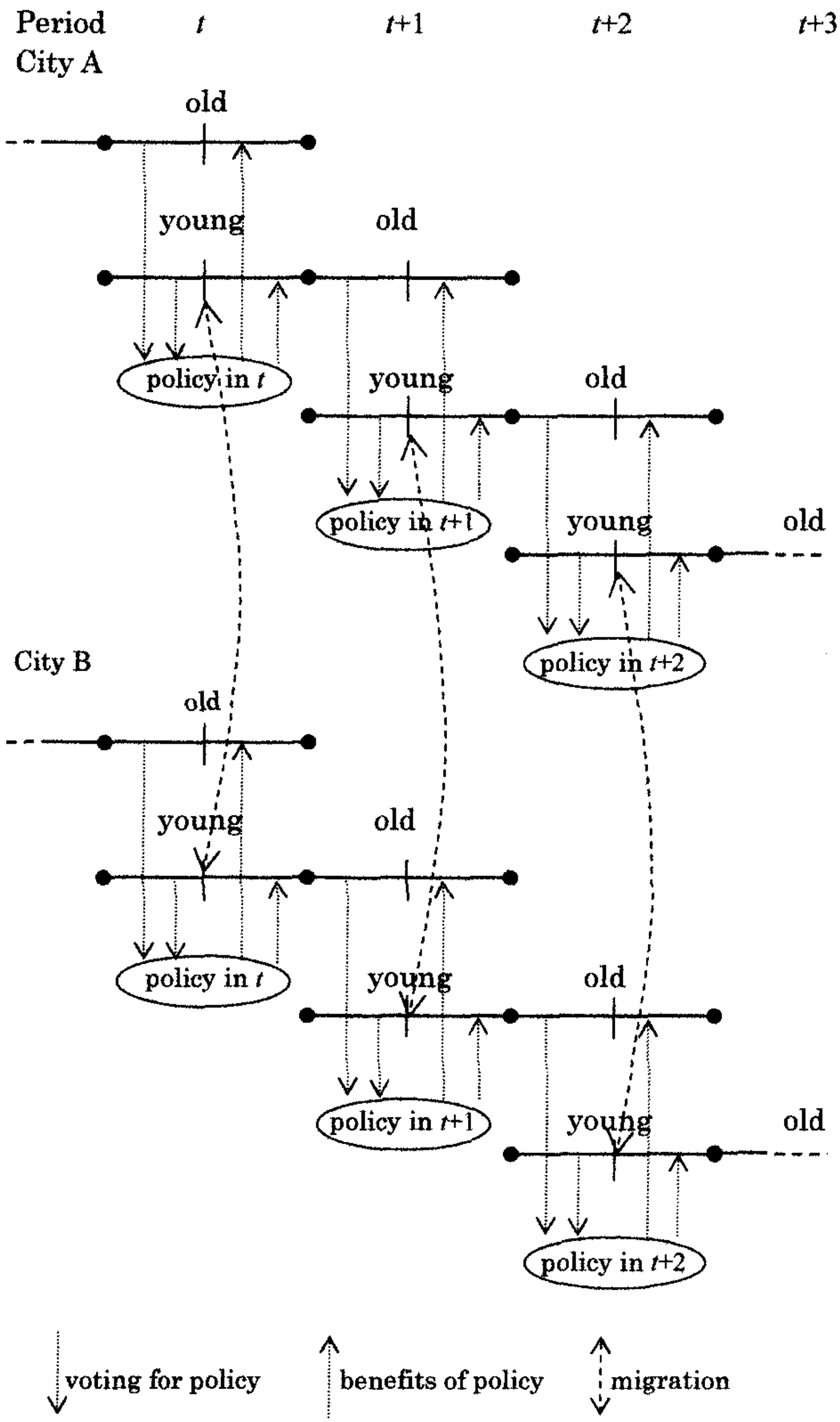
Period
t
t+1
t+2
t+3
City A
old
young
old
policy in t
young
old
policy in t+1
young
old
policy in t+2
City B
old
young
old
policy in t
young
old
policy in t+1
young
old
policy in t+2
voting for policy
benefits of policy
migration

Figure 1

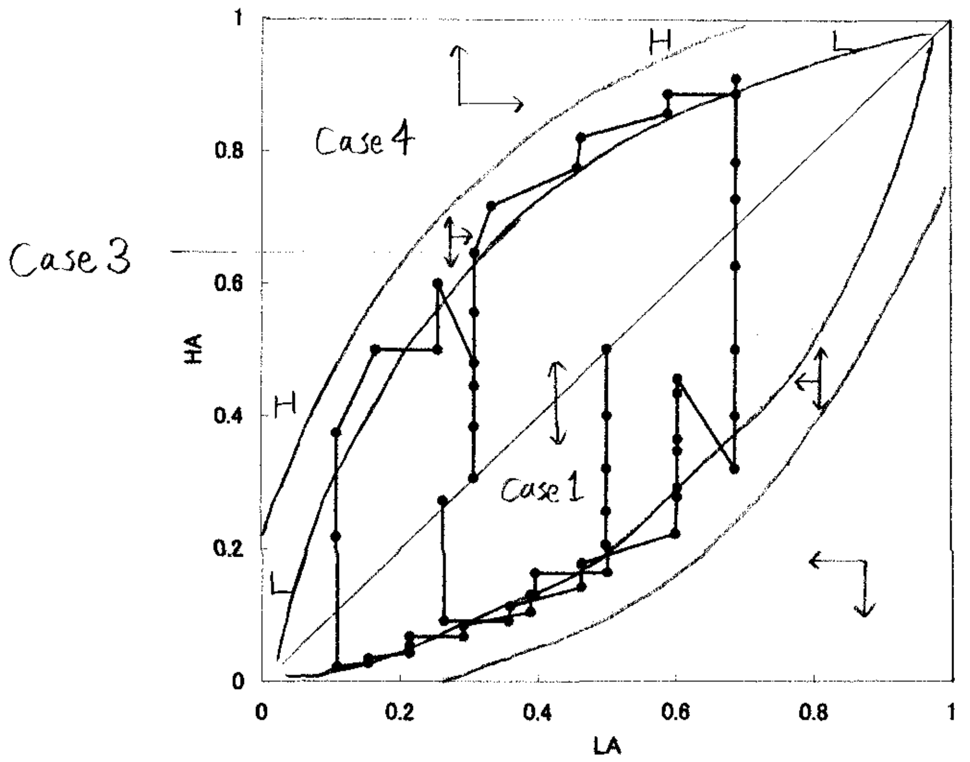

Figure 2(a)
Dynamics when the migration cost is small

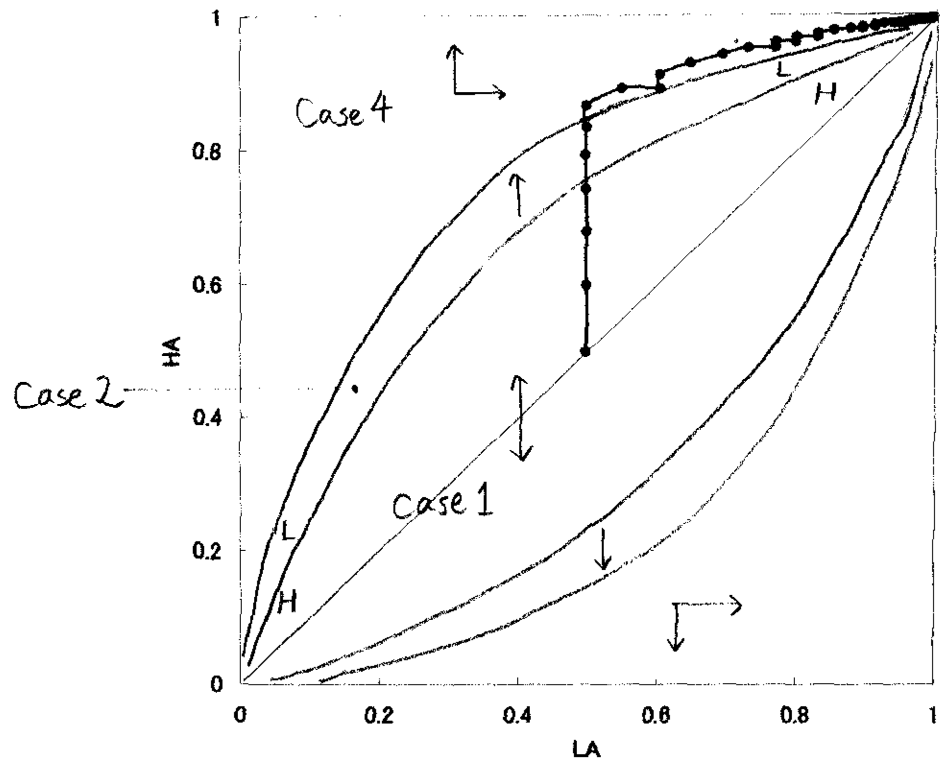

Figure 2(b)
Dynamics when the migration cost is large (i)

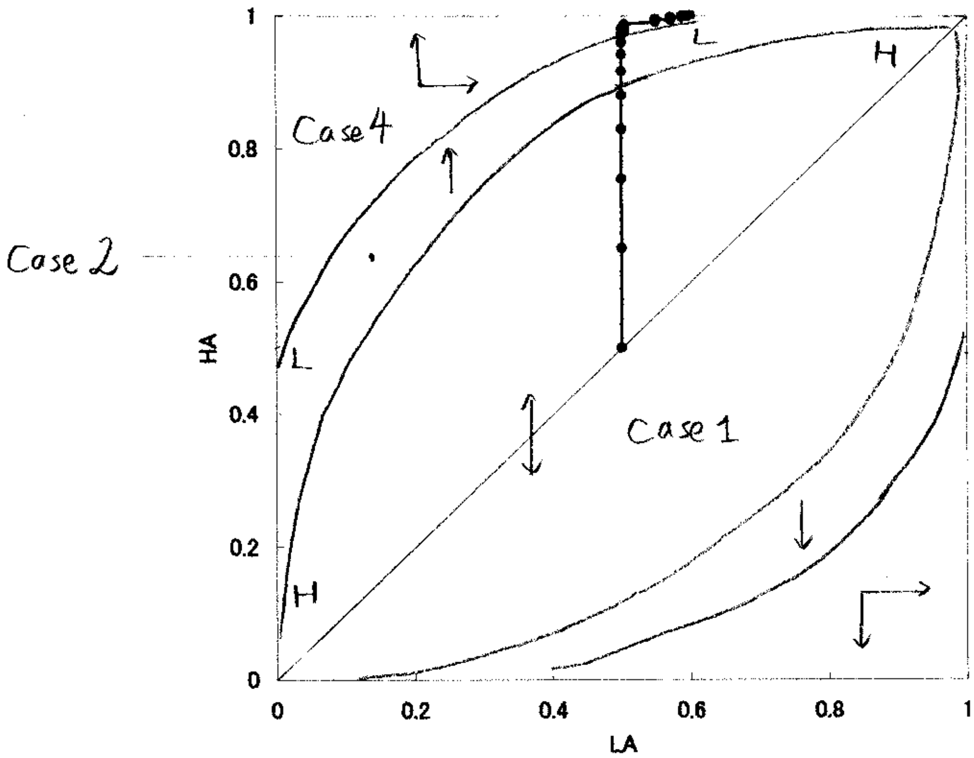

Figure 2(c)
Dynamics when the migration cost is large (ii)

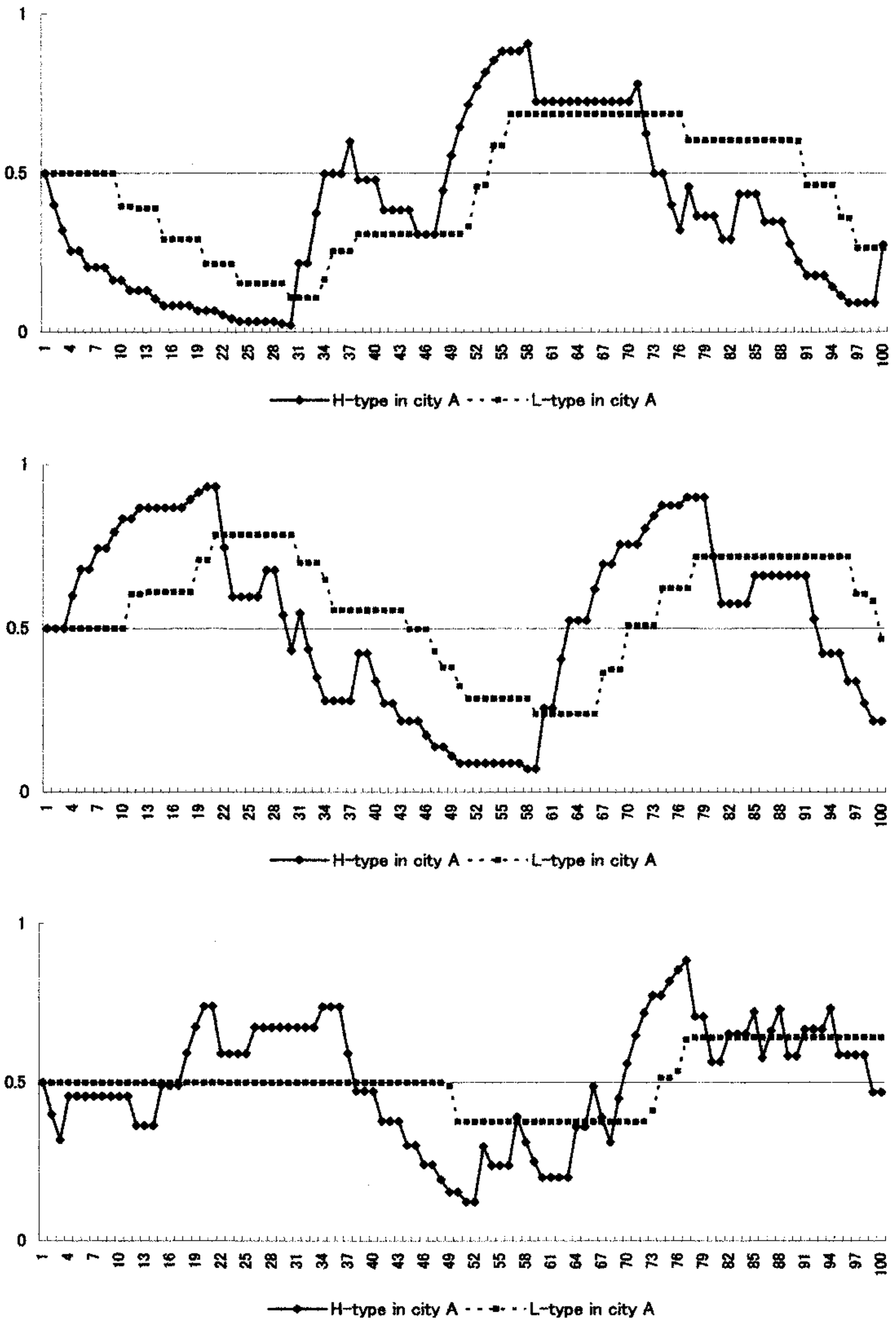

Figure 3(a)
Simulation results when the migration cost is small

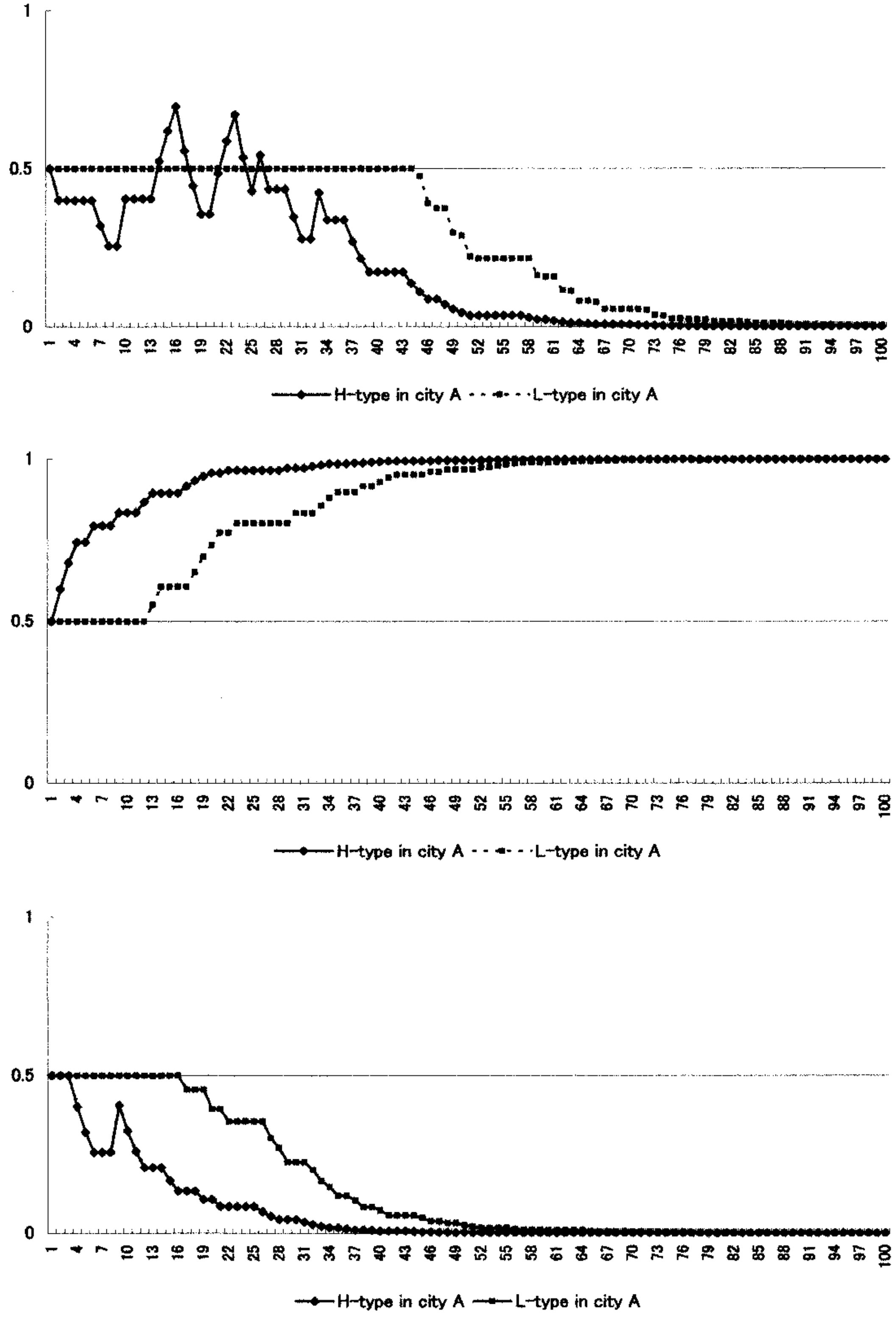

Figure 3(b)
Simulation results when the migration cost is large (i)

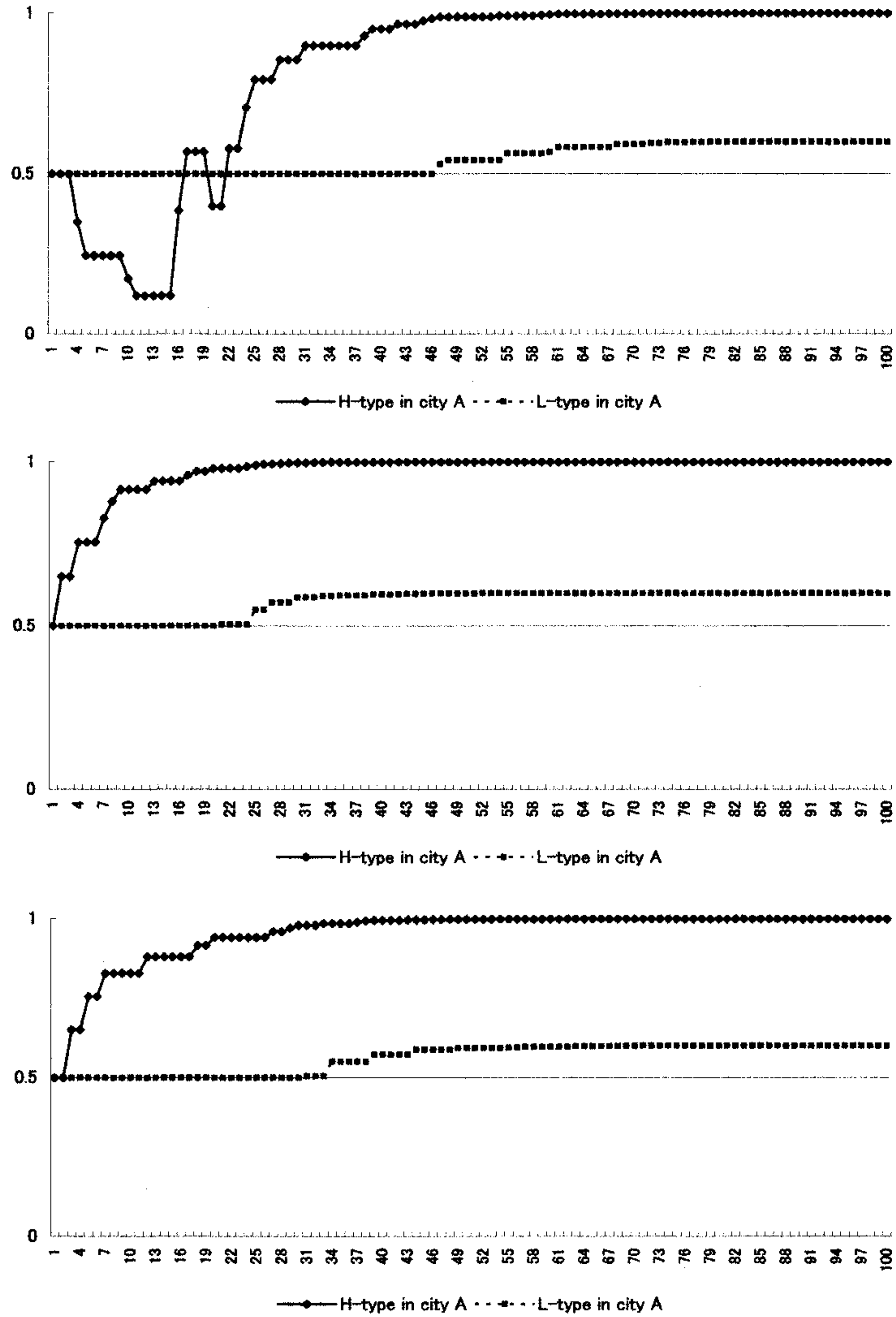

Figure 3(c)
Simulation results when the migration cost is large (ii)