

Human Capital in Large Metropolitan Areas in the United States

William Sander*

Department of Economics, DePaul University, 1 East Jackson Blvd., Chicago, IL 60604, USA

Abstract: The evidence indicates that human capital is an increasingly important determinant of where firms and households locate in the United States. Further, large metropolitan areas have been shown to have an advantage in attracting and producing highly skilled workers. The research in this study provides new information on the relationship between specific large metropolitan areas and educational attainment. The effects of metropolitan areas on educational attainment are separated out from the effects of demographic and family background, household location at age sixteen, and migration. It is shown that metropolitan areas either have no effect or very modest effects on attainment with a few exceptions. Data from the National Opinion Research Center's "General Social Survey" (GSS) are used. The GSS is a large cross-sectional national sample of respondents who are at least eighteen years old and live in a non-institutional setting. It has been taken either annually or biannually since 1972. Data are used for samples from 1993 to 2008 so that the paper has a contemporary focus.

Keywords: Education, human capital, metropolitan areas.

INTRODUCTION

If one goes back in time, industrial location decisions were based primarily upon factors such as the transportation costs of inputs, the distribution costs of products, labor costs, energy costs, taxes, and agglomeration economies [1-7]. Although these factors are still of some importance, studies indicate that industrial location decisions and urban and regional economic development are increasingly linked to the location of human capital and the ability to attract skilled workers to an area.

For example, Glaeser, Schneiknman, and Sheifer [8] and Glaeser and Shapiro [9] show that various measures of educational attainments have positive effects on urban and regional growth. Also, Sander and Schaeffer [10] show that educational attainment has a positive effect on employment growth in urban counties in the United States taking into account the industry mix in a county.

Although the relationship between human capital and regional growth is not in question, less attention has been given to the determinants of human capital accumulation by location. Glaeser and Mare [11] show that workers tend to acquire more skills in dense urban areas. Wheeler [12] shows that human capital growth is higher in metropolitan areas that have higher levels of educational attainment and population growth. Glaeser, Kolko, and Saiz [13] show that more educated workers are attracted to locations with better amenities.

There are many other reasons why human capital levels might vary by location. First, differences in family background vary by location. Since the Coleman Report [14], it has been established that family background is a key determinant of educational outcomes. Becker [15] among

many others has explored the effects of many family background variables such as parents' income and education, single parenthood, number of siblings, and ethnic and religious background on human capital. This implies that human capital accumulation in a metropolitan area is at least partly linked to the characteristics of households in the area.

Second, variations in the quality of schooling by location could affect educational outcomes. The quality of schooling might vary by location for many reasons including differences in spending by location. Spending might affect the ability to hire high quality teachers and, subsequently, student achievement. Expenditures per pupil might also affect class size and student achievement. Hanushek [16] summarizes the related literature on this topic. One of his important findings is that resources do not appear to have a large effect on educational outcomes. However, research by Card and Krueger [17] and others suggests that resources matter, at least modestly.

Other school quality-related factors such as private school attendance and competitive pressures might also vary by location. For example, research by Borland and Howsen [18] suggests that competition among public schools increases the quality of education. Thus, a higher degree of decentralization in a metropolitan area might result in more competition among public schools. Further, competitive pressure from private schools might raise the level of achievement [19, 20].

A larger private sector in education might also increase educational outcomes. Studies by Coleman, Hoffer, and Kilgore [21] and Coleman and Hoffer [22] suggested that private schools had positive effects on educational outcomes. Thus, an increase in private school attendance in an area might raise the level of academic achievement in that area. One of the criticisms of research on private schools is that more favorable outcomes could be a result of selection rather than causation. In this case, a larger private school sector might not raise student achievement. However, a recent

*Address correspondence to this author at the Department of Economics, DePaul University, 1 East Jackson Blvd., Chicago, IL 60604, USA; E-mail: wsander@depaul.edu

study by Altonji, Elder, and Taber [23] that addresses the selectivity issue, finds that Catholic schools have a positive effect on educational attainment, but no effect on test scores. Catholic schools represent the largest share of the private school sector. Thus, metropolitan areas with more Catholic schools and, perhaps, other private schools might expect to have higher levels of educational attainment.

And third, educational differences could be a result of migration. It is well known that education tends to increase domestic migration [24]. For this reason, locations that attract domestic migrants should have higher levels of educational attainment. The effects of international migration are less clear and depend upon the country of origin of the migrant.

In a related study, Sander [25] shows that men and women who live in the largest metropolitan areas in the United States and who grew up in the largest metropolitan areas have higher levels of educational attainment. This is shown to be a result primarily of migration (for current location) and family background factors. Further, the results are shown for areas by size. Undoubtedly, there is substantial heterogeneity in the effects of large metropolitan areas on educational outcomes. This study further explores this heterogeneity in the determinants of human capital accumulation by location. Particular attention is given to the effects of the twenty-one largest metropolitan areas on educational attainment in the United States. A data set is used (“The General Social Survey”) that has a large number of background variables that are relevant to educational outcomes. It is shown that if the background characteristics of respondents are not taken into account, metropolitan areas have relatively large effects on educational attainment, especially on the percentage with a college education. However, if many background factors are taken into account, most large metropolitan areas have either no effect or very modest effects on educational attainment. It is shown that the Chicago, Cleveland, Dallas, Miami, Philadelphia, and Tampa metropolitan areas do less well relative to the New York metropolitan area while the Minneapolis and Washington, D.C. metropolitan areas do slightly better than New York.

MODELS AND DATA

Ordinary Least Squares (OLS) estimates of educational attainment (years of schooling) are undertaken for men and women ages twenty-five to sixty-four who live in one of the twenty-one largest metropolitan areas in the United States. Smaller metropolitan areas are excluded because the sample size is too small to generate meaningful estimates. A focus is given to men and women twenty-five to sixty-four because a relatively high percentage of younger respondents are still in school and many older respondents are no longer in the labor force. Probit estimates of the probability of having sixteen or more years of schooling (called “college”) and less than twelve years of schooling (called “dropout”) are also undertaken. All of the estimates are corrected for heteroskedasticity. The corrected estimates were only modestly different from the uncorrected estimates indicating that heteroskedasticity was not a significant problem in the estimation strategy. Also, the data set is relatively large so that multicollinearity among the independent variables is not

a problem. This would not be the case if aggregate data were used.

Table 1. Educational Attainment by Metropolitan Area, Population 25+, 2002

Metropolitan Area	16+ Years of Schooling	Less than 12 Years
Atlanta	35%	12%
Boston	41	12
Chicago	32	14
Cleveland	27	9
Dallas	31	18
Denver	38	13
Detroit	25	14
Houston	29	20
Los Angeles	26	23
Miami	27	19
Minneapolis	36	6
New York	32	16
Philadelphia	31	13
Phoenix	28	14
Pittsburgh	31	10
St. Louis	31	12
San Diego	32	14
San Francisco	40	11
Seattle	34	8
Tampa	26	15
Washington D.C	43	11

Sources: U.S. Bureau of the Census. 2003.

In the OLS estimate of educational attainment, three different estimates of the dependent variables are undertaken. In the first case, adjustments are made for the metropolitan area (relative to the New York metropolitan area), gender, age, and age squared. This estimate is undertaken to show how the metropolitan area and educational attainment are correlated when key background factors are not taken into account.

In the second case, a large number of background variables are added that indicate demographic aspects of the respondent and aspects of the respondent’s family background at age sixteen. These include father’s schooling (relative to college graduate), mother’s schooling (relative to college graduate), number of siblings, whether the respondent lived with both parents at age sixteen, whether the respondent was born in the United States (also whether the respondent’s parents and grandparents were born in the United States), religious upbringing (relative to mainstream “non-Fundamentalist” Protestant), black and Hispanic. In some cases, data on father’s (mother’s) education is missing. These observations are included as “father missing” and “mother missing” rather than excluding them. The second estimate also includes variables indicating aspects of the

location where the respondent lived at age sixteen. These include region (north, east, west and foreign relative to south) and type of residence (rural, town of less than 50,000, small city of 50,000 to 250,000, and big city of 250,000 and larger relative to suburbs of big cities of 250,000 and over). An adjustment is also made for the survey decade (1990 relative to 2000). In the third estimate, an additional adjustment is made for migration from another city or state since age sixteen.

The data set for this study is the National Opinion Research Center's "General Social Survey" (GSS). The GSS is a cross-sectional national survey that has been taken either annually or biannually since 1972. It consists of a survey of respondents eighteen years and older who live in a noninstitutional setting in the United States. I use data from the 1990 and 2000 sample frames so that the study has a contemporary focus. These frames include data from 1993 to 2008 (the most recent survey year). Also, it is important to use a number of years of the GSS so that an adequate number of observations are available for metropolitan areas in the analysis.

Restricted data are available in the GSS on the location of households by metropolitan area. The National Opinion Research Center provided this information so that the location of households could be identified. This resulted in over six thousand observations for the twenty-one metropolitan areas. The smallest metropolitan areas in this study represented about two percent of the sample. Thus, there were over one hundred observations for the smallest area. The largest metropolitan area (New York) represented about eighteen percent of the sample or about one thousand observations. All of the estimates are relative to the New York City metropolitan area.

The New York City metropolitan area has roughly average levels of educational attainment for the sample. Although educational outcomes are about average in the New York area, expenditures per pupil in public schools are relatively high. New York State (and New Jersey) has the highest levels of spending per pupil in the United States—about \$14,000 per pupil in 2004-2005. The average expenditure in 2004-2005 was a little less than \$9,000 per pupil [26].

In Table 1, 2002 data are arrayed on measures of educational attainment from the United States Census Bureau [27] for the population twenty-five and over. The data indicate the highest levels of educational attainment in the Boston, Minneapolis, Seattle, and Washington, D.C. areas and the lowest levels of attainment in the Cleveland, Miami, Philadelphia, and St. Louis areas. The Boston, Minneapolis, Seattle, and Washington, D.C. metropolitan areas also have the highest percentage of college graduates while Cleveland, Miami, Philadelphia, and St. Louis have the lowest percentages of college graduates. There is almost a two to one difference in the percentage with a college degree in high human capital metropolitan areas like Minneapolis relative to low human capital areas like Cleveland. The percentage of the population with less than a high school education varies less with Minneapolis and Seattle having very low levels and other metropolitan areas having around one in ten.

Summary statistics for the GSS data are presented in Table 2. For brevity, I do not report on the percentages for each metropolitan area. The data indicate that respondents have about fourteen years of schooling on the average. A little over one in three is a college graduate while a little over one in ten has less than a high school education.

EMPIRICAL RESULTS

OLS estimates of education attainment (years of schooling) are presented in Table 3. All of the estimates are relative to the New York City metropolitan area. The first model shows that when adjustments are only made for age (and age squared) and gender, the Boston, Minneapolis, Seattle, and Washington, D.C. areas have significantly higher levels of attainment while Cleveland, Dallas, Tampa, Miami, Pittsburgh and Philadelphia have significantly lower levels of attainment. When the demographic and family background factors are taken into account (column 2), the coefficients for Boston and Seattle become insignificant and the Minneapolis and Miami coefficients decrease in size by about one-half. The negative Cleveland, Pittsburgh, Tampa, and Philadelphia coefficients remain significant. Also, the negative Chicago coefficient becomes significant while the Dallas coefficient becomes insignificant. The other significant determinants of educational attainment include negative (lower) parents' education, black, Hispanic, number of siblings, parents born in the United States, rural, small city, west, foreign (location at age 16), Catholic, fundamentalist Protestant, and no religious upbringing effects. Jewish upbringing is the only other variable that has a significant positive effect.

The key change in the results when migration is taken into account (column 3) is that the negative Dallas coefficient becomes significant once again while the negative Pittsburgh coefficient becomes insignificant. Also, the coefficient for Washington, D.C. declines in magnitude and is now only significant at the 10% level.

Overall, the results tend to indicate that metropolitan areas have either no effect or a modest effect on educational attainment relative to the New York City metropolitan area.

A minority ($n=8$) of the metropolitan area coefficients were significantly different from zero at the ten percent level of significance. The difference in the largest positive effect (.4 for Minneapolis and Washington, D.C.) and the largest negative effect (-.9 for Cleveland) is about one-seventh and one-third of a standard deviation for educational attainment, respectively.

Probit estimates of the probability of having sixteen or more years of schooling (called "College") or less than twelve years of schooling (called "Dropout") are presented in Table 4. The same independent variables were used to estimate the probit models. For brevity, only the coefficients for the metropolitan areas are reported. The first estimate (called "College 1") simply adjust for the metropolitan area, age, age squared, and gender. The second estimate (called "College 2") adjusts for all of the other background factors that were used to estimate educational attainment (column 3 of Table 3). When adjustments are only made for age (and age squared) and gender, Boston, Seattle, and Washington,

Table 2. Summary Statistics

	Mean	Standard Deviation
Years of Schooling	14.0	3.0
College Grad	36.7%	48.2
High School Dropout	11.5%	31.9
Age	42.3 years	10.6
Mother Less Than High School	24.7%	43.1
Mother High School	37.5%	48.4
Mother Some College	13.7%	34.3
Mother Missing	10.4%	30.5
Father Less Than High School	22.6%	41.8
Father High School	23.8%	42.6
Father Some College	9.4%	29.2
Father Missing	25.6%	43.6
Black	18.8%	39.1
Hispanic	10.2%	30.2
Catholic	40.1%	49.0
Fundamentalist Protestant	23.5%	42.4
Jewish	3.5%	18.4
Other Religion	5.4%	22.6
No Religion	6.6%	24.8
Siblings	3.6	3.1
Own Parents	68.4%	46.4
Born U.S.	80.7%	39.5
Parents U.S.	72.0%	44.9
Grandparents U.S.	44.4%	49.7
Domestic Migrant	67.9%	46.7
Rural	11.5%	31.9
Town	24.6%	43.1
Small City	16.8%	37.4
Big City	26.3%	44.0
East	26.4%	44.1
North	21.3%	40.9
West	19.1%	39.3
Foreign	14.8%	35.5
Male	44.1%	49.7

Source: National Opinion Research Center, "General Social Survey: 1993-2008."

D.C. have significant positive effects while Chicago, Cleveland, Dallas, Minneapolis, Philadelphia, St. Louis, and San Francisco have significant negative effects. When the additional background variables are held constant, the Boston, Dallas, Minneapolis, Philadelphia, St. Louis, San Francisco, and Seattle coefficients become insignificant while the negative Tampa coefficient becomes significant. Thus, the negative Chicago, Cleveland, and Miami effects and the positive Washington, D.C. effects retain their significance. Once again, the results are relative to the New

Table 3. OLS Estimates of Education Attainment

	(1)	(2)	(3)
Atlanta	.17	-.04	-.15
Boston	.81***	.11	.08
Chicago	-.17	-.33**	-.33**
Cleveland	-.75***	-.99***	-.89***
Dallas	-.41**	-.31	-.35*
Denver	.32	.05	-.05
Detroit	.01	-.17	-.10
Houston	-.22	-.13	-.19
Los Angeles	.07	.21	.11
Miami	-.71***	-.37**	-.43**
Minneapolis	.89***	.42*	.41*
Philadelphia	-.47***	-.45***	-.42***
Phoenix	.33	.29	.17
Pittsburgh	-.40*	-.52**	-.30
St. Louis	-.42*	-.18	-.18
San Diego	.11	.25	.16
San Francisco	-.17	-.07	-.18
Seattle	.81***	.23	.09
Tampa	-.47**	-.54**	-.64***
Washington, D.C.	.66***	.51***	.38*
Age	.13***	.13***	.12***
Age Squared	-.0015***	-.0013***	-.0012***
Male	.36***	.18***	.18***
Mother Less Than High School		-1.58***	-1.51***
Mother High School		-1.02***	-.97**
Mother Some College		-.45***	-.43***
Mother Missing		-2.19***	-2.14***
Father Less Than High School		-1.50***	-1.47***
Father High School		-1.04***	-1.01***
Father Some College		-.41***	-.41***
Father Missing		-1.49***	-1.44***
Siblings		-.12***	-.12***
Own Parents		.08	.11
Born U.S.		.14	.15
Parents U.S.		-.54***	-.54***
Grandparents U.S.		-.03	-.02
Rural		-.72***	-.79***
Town		-.03	-.09
Small City		-.21**	-.20**
Big City		.02	.13
East		.03	.002

(Table 3 contd.....)

	(1)	(2)	(3)
West		-.43***	-.36**
North		.09	.05
Foreign		-.46***	-.74***
Catholic		-.21**	-.18**
Jewish		.74**	.75***
Fundamentalist		-.21**	-.20**
Other Religion		.18	.21
No Religion		-.27*	-.23
Black		-.46***	-.37***
Hispanic		-1.32***	-1.28***
Migrant			.72***
Constant	11.3	14.4	14.2
R ²	.03	.27	.28
N	6,346	6,346	6,346

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Note: Estimates relative to the New York City metropolitan area.

York City metropolitan area. This means that only six of the twenty metropolitan area coefficients are significantly different from the New York City metropolitan area. The pattern in the other results (not shown) is similar to the pattern that was found in the estimates of educational attainment.

The “dropout” estimates indicate that several metropolitan areas have significantly lower dropout rates than the New York City metropolitan area if adjustments are only made for age, age squared, and gender. These include Atlanta, Boston, Los Angeles, Minneapolis, Phoenix, and Seattle. Only two areas (Philadelphia and Tampa) are found to have significantly higher dropout rates when all of the other background variables are taken into account. Thus, the other eighteen metropolitan areas do not have a significantly different dropout rate from the New York City metropolitan area once many background factors are taken into account.

I also estimated educational attainment for younger respondents (not shown). One of the reasons for examining educational attainment for younger respondents is that the characteristics of a metropolitan area might have a larger effect on younger respondents who are more likely to have lived there growing up. For respondents in their 20s, the Washington, D.C. and Miami metropolitan areas have significant positive effects on educational attainment adjusting for all of the background factors that have been used above. The Philadelphia metropolitan area has a significant negative effect on educational attainment for respondents in their 20s. It could not be shown that any of the other metropolitan areas had an effect that was different from the New York City metropolitan area.

Table 4. Probit Estimates of College Graduates and High School Dropouts

	College Model 1	College Model 2	Dropout Model 1	Dropout Model 2
Atlanta	.004	-.02	-.04*	-.004
Boston	.11***	.01	-.06**	.01
Chicago	-.06**	-.06*	-.02	.01
Cleveland	-.22***	-.25***	-.004	.02
Dallas	-.07**	-.06	.03	.01
Denver	.05	.02	-.04	.01
Detroit	-.03	.01	.005	.02
Houston	-.02	-.002	-.01	-.01
Los Angeles	-.04	-.02	-.03*	-.02
Miami	-.16***	-.14***	.04*	.01
Minneapolis	.09**	.05	-.13**	-.04
Philadelphia	-.09***	-.06**	.02	.02*
Phoenix	-.01	-.01	-.07**	-.03
Pittsburgh	-.06	-.005	-.02	.01
St. Louis	-.13***	-.05	-.02	-.002
San Diego	-.03	-.03	-.005	-.01
San Francisco	-.05*	-.03	.001	.01
Seattle	.11**	.04	-.11***	-.03
Tampa	-.06	-.09**	.02	.03*
Washington D.C.	.13***	.13***	-.02	-.004

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Notes: Coefficients indicate marginal effects. Estimates are relative to the New York City metropolitan area.

As suggested above, one of the reasons why some metropolitan areas might have higher (or lower) levels of educational attainment is that they have been higher (lower) quality schools. Many of the respondents in the GSS acquired their schooling at locations that differ from their current location. Further, it is difficult to measure the quality of schooling, an unobserved variable. However, if the sample is restricted to respondents who live in the same location as they lived as age sixteen and adjustments are made for all of the demographic and family background variables, the following metropolitan areas have significantly lower levels of educational attainment relative to the New York City metropolitan area (Chicago, Cleveland, Detroit, Minneapolis, Philadelphia, San Diego, St. Louis, and Seattle). This is not a rigorous test of the effects of metropolitan areas on educational attainment because non-migrants are a select group. However, it provides information on why some areas do better than others. Further, if the sample is restricted to non-migrants who lived in central cities at age sixteen, three cities have significantly lower levels of educational attainment relative to New York City (Chicago,

Cleveland, and Philadelphia). For this group, the sample size becomes small making it difficult to estimate the effects of small cities. Thus, some cities and metropolitan areas have lower levels of educational attainment partly because they retain non-migrants who acquired relatively low levels of education there.

CONCLUSIONS

This study shows that if demographic differences and family background are taken into account, the effects of a metropolitan area on measures of educational attainment tend to be either modest or zero with a few exceptions. I find that the Cleveland metropolitan area has the largest negative effect on educational attainment followed by Tampa and Miami while the Washington, D.C. metropolitan area has the largest positive effect. In the case of Cleveland, this might be a result of very poor economic performance over the past few decades [28]. In the cases of Tampa and Miami, the results could be related to relatively low levels of spending. On the average, public schools in Florida spend about half as much per pupil as do schools in New York State [26]. The Washington, D.C. metropolitan area is the most affluent in the United States. This undoubtedly affects educational outcome favorably as well as its ability to attract highly educated workers. Migrants to the Washington, D.C. area have the highest level of educational attainment relative to migrants of other large metropolitan areas. The Chicago and Philadelphia metropolitan areas also have modest negative effects on educational attainment. Although metropolitan areas can affect their economic future either by producing or attracting more educated workers, the evidence indicates that on the average most large metropolitan areas do not differ that much in their propensity to do this.

The results also indicate that metropolitan areas that have more educated parents, smaller family size, foreign-born parents, and Jewish households tend to produce more human capital. Metropolitan areas with more residents from a rural background and a Catholic, fundamentalist Protestant, or no religious upbringing tend to produce less human capital.

Further, estimates indicate that in a number of metropolitan areas and cities, respondents who have lived there since age sixteen have significantly lower levels of educational attainment. It would be of interest to estimate the effects of the city and/or metropolitan area of residence at age sixteen for all respondents (migrants and non-migrants). This is grist for future research.

ACKNOWLEDGEMENT

The author would like to thank an anonymous reviewer for his comments.

REFERENCES

- [1] Benson B, Johnson R. The lagged impact of state and local taxes on economic activity. *Econ Inq* 1986; 24: 389-420.
- [2] Carlino G, Mills E. The determinants of county growth. *J Reg Sci* 1987; 27: 39-54.
- [3] Carlton D. The location and employment choices of new firms: an econometric model with discreet and continuous endogenous variables. *Rev Econ Stat* 1983; 65: 440-9.
- [4] Doeringer P, Terkla D, Tapakian G. *Invisible factors in local economic development*. New York: Oxford University Press 1987.
- [5] Helms J. The effect of state and local taxes on economic growth: a time-series cross-section approach. *Rev Econ Stat* 1985; 67: 574-82.
- [6] Plaut T, Pluta J. Business climate, taxes, and expenditures, and state industrial growth in the United States. *South Econ J* 1983; 50: 99-119.
- [7] Wasylenko M, McGuire T. Jobs and taxes: the effect of business climate on states' employment growth rates. *Natl Tax J* 1985; 38: 497-512.
- [8] Glaeser E, Schneinkman JA, Shleifer A. Economic growth in a cross-section of cities. *J Monet Econ* 1995; 36: 117-43.
- [9] Glaeser E, Shapiro J. Urban growth in the 1990s. *J Reg Sci* 2003; 43: 139-65.
- [10] Sander W, Schaeffer P. Schooling and urban employment growth. *J Econ Bus* 1991; 43: 69-77.
- [11] Glaeser E, Mare D. Cities and skills. *J Labor Econ* 2001; 19: 316-42.
- [12] Wheeler C. Human capital growth in a cross-section of U.S. metropolitan areas. *Federal Reserve Bank of St. Louis Review* 2006.
- [13] Glaeser E, Kolko J, Saiz A. Cities and skills. *J Labor Econ* 2001; 19: 316-42.
- [14] Coleman J. *Equality of educational opportunity*. Washington, D.C.: U.S. Government Printing Office 1966.
- [15] Becker GS. *A treatise on the family*. Cambridge: Harvard University Press 1991.
- [16] Hanushek E. *Publicly provided education*. Cambridge, MA: National Bureau of Economic Research Working Paper 8799, 2002.
- [17] Card D, Krueger A. School resources and student outcomes: an overview of the literature and new evidence from North and South Carolina. *J Econ Perspect* 1996; 10: 31-50.
- [18] Borland M, Howsen R. Student academic achievement and the degree of market concentration in education. *Econ Educ Rev* 1992; 11: 3-39.
- [19] Dee T. Competition and the quality of public schools. *Econ Educ Rev* 1988; 17: 419-27.
- [20] Hoxby C. *Do private schools provide competition for public schools?* Cambridge, MA: National Bureau of Economic Research Working Paper No. 4798, 1994.
- [21] Coleman J, Hoffer T, Kilgore S. *High school achievement*. New York: Basic Books 1982.
- [22] Coleman J, Hoffer T. *Public and private high schools*. New Brunswick: Basic Books 1987.
- [23] Altonji J, Elder T, Taber C. Selection on observed and unobserved Variables: assessing the effectiveness of Catholic schools. *J Polit Econ* 2005; 113: 151-84.
- [24] Greenwood M. Internal migration in developed countries. In: Rosenzweig M, Stark O. Eds. *Handbook of population economics*. Amsterdam: Elsevier 1997.
- [25] Sander W. Educational attainment and residential location. *Educ Urban Soc* 2006; 38: 307-26.
- [26] United States Census Bureau. *Public education finances 2005*. Washington, D.C.: United States Census Bureau 2007.
- [27] United States Census Bureau. *Educational attainment by metropolitan area 2002*. Washington, D.C.: United States Census Bureau 2003.
- [28] Dunne T. *The growth of cities in the fourth district*. Cleveland: Federal Reserve Bank of Cleveland 2007.