ISSN 2067-4082
e-ISSN 2068-9969
L-ISSN 2067-4082

Journal of Urban and Regional Analysis

Volume V - Issue 1 - 2013

CONTENTS

www.jurareview.ro

University of Bucharest

Journal of Urban and Regional Analysis Volume V - Issue 1 - 2013

The manuscripts and exchange reviews, as well as, any correspondence will be sent on the Editorial Office:

University of Bucharest - Interdisciplinary Centre for Advanced Research on Territorial Dynamics
030018, 4-12, Regina Elisabeta Blv., Bucharest, Romania
Tel/fax: 0040 213 138 410, e-mail: office@cicadit.ro, http://www.jurareview.ro

Journal of Urban and Regional Analysis

Volume V - Issue 1 - 2013

Journal indexed in:

EBSCO
CENTRAL & EASTERN EUROPEAN ACADEMIC SOURCE DATABASE COVERAGE LIST
PROQUEST SCITECH JOURNALS
ULRICHSWEB
DIRECTORY OF OPEN ACCESS JOURNALS (DOAJ)
KNOWLEDGE BASE SOCIAL SCIENCES EASTERN EUROPE (GESIS)
INDEX COPERNICUS INTERNATIONAL

University of Bucharest

The review is issued under the aegis and the support of the
University of Bucharest - Interdisciplinary Centre for Advanced Research on Territorial Dynamics

www.jurareview.ro

Journal of Urban and Regional Analysis,
vol. V, 1, 2013

CONTENTS

* *

Journal of Urban and Regional Analysis,
vol. V, 1, 2013, p. 5 - 44

GEOGRAPHICAL AND STATISTICAL ANALYSIS ON THE RELATIONSHIP BETWEEN LAND-USE MIXTURE AND HOME–BASED TRIP MAKING AND MORE: CASE OF RICHMOND, VIRGINIA

Yin-Shan **MA**[1)], *Xueming* **CHEN**[2)]
[1)]City of New Taipei, Taiwan; [2)] Virginia Commonwealth University, United States

Abstract: Richmond, Virginia has implemented numerous mixed land-use policies to encourage non-private-vehicle commuting for decades based on the best practices of other cities and the assumption that land-use mixture would positively lead to trip reduction. This paper uses both Geographical Information Systems (GIS) and statistical tools to empirically test this hypothesis. With local land use and trip making data as inputs, it first calculates two common indices of land-use mixture - entropy and dissimilarity indices, using GIS tool, supplemented by Microsoft Excel. Afterwards, it uses Statistical Package for Social Sciences (SPSS) to calculate the correlation matrices among land-use mixture indices, socioeconomic variables, and home-based work/other trip rates, followed by a series of regression model runs on these variables. Through this study, it has been found that land-use mixture has some but weak effects on home-based work trip rate, and virtually no effects on home-based other trip rate. In contrast, socioeconomic variables, especially auto ownership, have larger effects on home-based trip making.

Key Words: *land-use mixture, socioeconomic variables, home-based trip rates, entropy index, dissimilarity index.*

Introduction

A mixed-use development is a single physically and functionally integrated development of three or more revenue-producing uses developed in conformance with a coherent plan. Because the diversity of land uses is believed to provide a multifunctional living space and allows for a more efficient utilization of urban land and a reduced distance between origin and destination, mixed-use has become a widely accepted trip reduction strategy included in many transportation plans.

However, thus far, a rigorous and quantitative analysis on the relationship between land-use mixture and trip reduction is still lacking and inconclusive. The assumption that land-use mixture will necessarily lead to reduced trip making is often called into question. In fact, it is usually hard to prove the existence of a positive and causal relationship between mixed land-use and trip reduction due to the confounded effects from other factors.

This study is intended to assess the impacts of mixed-use development on home-based trip rates (person trips per household) in Richmond, Virginia, United States (U.S.). Through this empirical study, the paper will quantify the correlation relationship between land-use mixture, socioeconomic variables, and trip making by means of both geographical and statistical tools. On the geographical front, the paper utilizes the tool of Geographical Information System (GIS),

supplemented by Microsoft Excel, to calculate entropy and dissimilarity indices for measuring land-use mixture. On the statistical front, the paper relies on Statistical Package for Social Sciences (SPSS) to measure the correlation and regression relationships among home-based trip rates, land-use mixture indices, and socioeconomic variables. Because of its theoretical and practical contributions, this study has its research significance.

Following this introduction, this paper contains five additional sections. Section 2 is a literature review. After that, Section 3 introduces the research methodology. Section 4 then briefly describes the geographical setting of Richmond, Virginia, focusing on its location, demography, land use, poverty, and transportation. As the core component of this paper, Section 5 presents the analytical results calculated using GIS, MS Excel, and SPSS tools. Finally, Section 6 summarizes research findings and draws conclusions.

Literature Review

There is a voluminous literature on the relationship between built environment (BE, which includes the so-called "D" variables, such as density, diversity, design, distance to transit, and others) and travel behavior (TB). Due to the space limitation, this section only provides a concentrated review of the BE-TB relationship, with a particular emphasis on the relationship between mixed use and trip frequencies.

An Overview

Even though the conventional four-step transportation model initially developed in the 1950s already includes the BE factors in the modelling process, the modern systematic studies on the relationship between BE and TB can be traced to the 1980s. In the 1980s, planners realized that the spatial distribution of trip origins and destinations could be used as a policy tool to affect travel. In the space of a few years, this idea was articulated in the form of jobs-housing balance (Cervero 1986,1989), transit-oriented development (Calthorpe 1993), the transportation elements of the new urbanism and neotraditional design (Duany and Plater–Zyberck 1991, Friedman, Gordon and Peers 1994, Kelbaugh 1989), and the explosive land use-travel studies from the mid-1990s (see, e.g., Cervero and Kockelman 1997, Ewing, Haliyur and Page 1995, Frank and Pivo 1995). So far, hundreds of papers and several literature reviews have been published (for reviews, see, e.g., Badoe and Miller 2000, Boarnet and Crane 2001, Boarnet 2011, Brownstone 2008, Crane 2000, Ewing and Cervero 2001, 2010, Handy 2005, Heath et al. 2006, Henderson and Bialeschki 2005). The research is still going on because many issues have not been resolved yet.

Research on Mixed Use: Still Inconclusive

Mixed use or land use mixture is one of the key principles recommended in smart growth and new urbanism, which started in the early 1990s. It is generally agreed that mixed use would have positive effects on travel. However, this research topic remains inconclusive. The disputes over the years have been centered around the extent of their effects, which part of travel (trip frequency, trip length, mode choice, or vehicle miles traveled) affected, spurious relationship between the variables including the correlation of travel variable with other non-BE variables such as socioeconomic variables, residential self-selection, association and causality determination, and others. Different scholars use different data sources, methodologies, geographic scales (neighborhood or larger area), and hypotheses, which naturally have yielded diverse and often inconsistent conclusions. The main arguments from proponents, skeptics and opponents are summarized below. Of course, their arguments are often overlapping due to its

complicated nature.

Effects of Mixed Use on Travel: A General Understanding

According to Smart Growth Online, by putting residential, commercial and recreational uses in close proximity to one another, alternatives to driving, such as walking or biking, become viable. Mixed land uses also provide a more diverse and sizable population and commercial base for supporting viable public transit (Source: http://www.smartgrowth.org/principles/mix_land.php).

National Cooperative Highway Research Program (NCHRP) Program Report 684 holds that mixed-use developments can achieve internal trip capture rates ranging between 0% and 53%, which would reduce traffic volumes on the external roadway system, according to the surveys conducted by Institute of Transportation Engineers (ITE) in 1998 (Transportation Research Board 2011).

Per Litman and Steele (2012), neighborhoods that mix land uses, make walking safe and convenient, and are near other development, allow residents and workers to drive significantly less if they choose. Mixed use is believed to reduce commute distances, particularly if affordable housing is located in job-rich areas, and mixed-use area residents are more likely to commute by alternative modes (Modarres 1993, Kuzmyak and Pratt 2003, Ewing and Cervero 2010, Spears, Boarnet and Handy 2010).

Frank and Pivo (1994) studied the impacts of land-use mix and density on use of the single occupancy vehicles, transit and walk modes, respectively, for shopping and work trips using data from the Puget Sound Transportation Panel, the U.S. Census Bureau and three local agencies in Washington State. From a simple correlation analysis, urban form and mode split were found to be significantly related.

With regard to the magnitude of impacts, based on a detailed review of research, Spears, Boarnet and Handy (2010) concluded that the elasticity of vehicle miles traveled (VMT) with respect to land use mix is -0.02 to -0.11 (a 10% increase in an entropy or dissimilarity index reduces average VMT by 0.2% to 1.1%). Ewing and Cervero (2010) found that land use mix reduces vehicle travel and significantly increases walking. Krizek (2003) found that households located in highly accessible neighborhoods travel a median distance of 3.2 km (2.0 mile) one-way for errands versus 8.1 km (5.0 mile) for households in less accessible locations.

Using travel diary data from the New York/New Jersey/Connecticut regional travel survey, Salon (2006) concluded that the built environment accounted for one half to two thirds of the difference in walking levels associated with changes in population density in most areas of New York City. Using travel diary data from the Austin travel survey, Zhou and Kockelman (2008) found that the built environment accounted for 58% to 90% of the total influence of residential location on VMT, depending on model specifications. Using travel diary data from northern California, Cao (2010) reported that, on average, neighborhood type accounted for 61% of the observed effect of the built environment on utilitarian walking frequency and 86% of the total effect on recreational walking frequency.

More Complicated Issues: Association versus Causality

Due to data limitations, almost all of the studies have used cross-sectional designs to establish a statistical association between the built environment and travel behavior, which does not

establish whether the cause precedes the effect. Most studies have controlled for socio-demographic characteristics, thereby minimizing the possibility that other confounding variables such as income or residential self-selection, for example, create a spurious relationship between the built environment and travel behavior.

Over the past few years, Cao, Mokhtarian, Handy and others conducted a series of studies on the residential self-selection issues. They found at least 38 studies using nine different research approaches have attempted to control for residential self-selection (Cao, Mokhtarian, and Handy 2009, Mokhtarian and Cao 2008). Nearly all of them found "resounding" evidence of statistically significant associations between the built environment and travel behavior, independent of self-selection influences. However, nearly all of them also found that residential self-selection attenuates the effects of the built environment on travel.

Using data from a regional travel diary survey in Raleigh, North Carolina, Cao, Xu and Fan (2009) estimated that anywhere from 48% to 98% of the difference in VMT was due to direct environmental influences, the balance being due to self-selection.

Using the survey data in eight neighborhoods in Northern California, Handy, Cao and Mokhtarian (2005) shows that a multivariate analysis of cross-sectional data shows that differences in travel behavior between suburban and traditional neighborhoods are largely explained by attitudes. However, a quasi-longitudinal analysis of changes in travel behavior and changes in the built environment shows significant associations, even when attitudes have been accounted for, providing support for a causal relationship.

Using data from the 2000 San Francisco Bay Area travel survey, Bhat and Eluru (2009) found that 87% of the VMT difference between households residing in conventional suburban and traditional urban neighborhoods is due to "true" built environment effects, while the remainder is due to residential self-selection.

Regarding the relative importance of BE variables and socioeconomic variables in impacting travel, several scholars thought that socioeconomic variables seem more important. According to Ewing and Cervero (2001), travel variables are generally inelastic with respect to change in measures of the built environment. More specifically, the built environment has a greater impact on trip lengths than trip frequencies and that mode choice depends as much on socioeconomic characteristics as on the built environment. Their analysis of the existing studies shows small but statistically significant effects of the built environment on vehicle miles traveled. Ewing and Cervero (2010) further concluded that trip frequency is primarily a function of socioeconomic characteristics of travelers and secondarily a function of the built environment. In other words, trip frequencies appear to be largely independent of land-use variables, depending instead on household socioeconomic characteristics.

Thill and Kim (2005) believes that there may be a propensity that travel behaviors are affected by socioeconomic characters, such as car ownership, household size, income, and family structure, etc.

McNally and Kulkarni (1997) examined relationships between the land-use transportation system and travel behavior to determine if policies advocating land-use modifications were likely to promote travel behavior changes. Three neighborhood types were defined, namely, traditional neighborhoods, planned neighborhoods, and mixed neighborhoods, the latter being a mixture of the elements of the former two. The data were collected in Orange County in 1991. Neighborhood type was found not to be a statistically significant factor in explaining the

variation in household trip generation and mode-choice. Income was found to be the single most important factor influencing travel behavior, leading the authors to conclude that the relationships between travel behavior and land-use were rather weak, therefore casting doubt on the efficacy of design-oriented solutions to address problems of congestion and air pollution.

Mixed Findings: A Quick Summary

It is also noted that a few scholars were skeptical about the effects of land-use mixture on vehicular travel (Boarnet and Sarmiento 1998, Crane and Crepeau 1998, Sarzynski et al. 2006, Stead 2001). Boarnet and Crane (2001) held that high-density and mixed-land uses may have indeterminate transportation impacts. It is impossible or ineffective to solve transportation problems through adjusting land use policies.

Badoe and Miller (2000) reviewed some studies on urban form impacts on travel behavior as well as studies of transit impacts on urban form. The findings of these studies are mixed, with some suggesting that land-use policies emphasizing higher urban densities, traditional neighborhood design, and land-use mix do result in declines to auto ownership and use, while enhancing patronage of the more environmentally friendly modes of transit and walk. Other studies find this impact to be at best very weak.

Cervero and Ewing (2010) argued that the correlation between mixed land-use and vehicle miles traveled (VMT) is far from consistent due to several reasons.

First, mixed land-use, without pedestrian or bicycle-friendly street design, convenient transit accessibility, or dense development, may not reduce non-work trip rate as expected (Cervero and Kockelman 1996). The main reasons for this situation have something to do with distance and density. If the distance between origin and destination is not close enough, or the street design is not convenient for non-vehicle commuters, then there is no appeal for people to use non-vehicle modes of transportation. Besides, land diversity and development density, “internal capture and pass-by capture,” which are the balance of service demand and supply within neighborhoods, also play an important role in mixed-use development (Cervero and Duncan 2006). For example, if home (origin) to service (destination) has a walkable distance, then the motorized trip rate will be lower; otherwise, the motorized trip rate tend to be higher. It should be noted that Cervero and Duncan (2006) emphasized that the influence of “internal and pass-by captures” for home to retail trips is more significant than that for home to work trips. In another study, Cervero even quantified the ideal service buffer to be 300 feet (about 91 meters). As a result, the concept of “internal and pass-by captures” relates to both density and diversity (trip stopover or destination) (Cervero 1996). Denser development facilitates journeys within a walkable distance and can lead to a lower VMT. In addition, a greater land-use mixture implies the potential for more services provided locally within a neighborhood.

Second, social networks pertain to the psychological behavior of groups. Related research suggests that people relocate according to their travel behavior preferences (Crane and Crepeau 1998, Krizek 2003). For instance, individuals who dislike driving will move to areas that provide better walking, bicycling, or transit accessibility. McFadden (2007) even proposed the idea of “imitation of travel behavior,” whereby residents of a neighborhood homogenize their travel behaviors over time. Furthermore, this phenomenon also involves the residents’ socio-economic distribution, such as income, vehicle availability, ethnicity, etc. (Cervero 1996). In brief, the concept of social networks means that people’s travel mode preferences may determine where they live and additionally shape their community’s socio-demographics, which, in turn, feed back into their travel behavior and the land uses in their neighborhood.

Opponents of Smart Growth

Even though smart growth, including mixed use, is gaining its popularity in the U.S., several scholars are strong opponents of its policies. For example, Robert Bruegmann (2007) stated that historical attempts to combat urban sprawl have failed. Cox and Utt (2004) argued before the United States Senate Committee on Environment and Public Works that, "smart growth strategies tend to intensify the very problems they are purported to solve." Peter Gordon and Harry Richardson wrote a number of articles to criticize compact cities and sprawl containment strategies. According to Gordon and Richardson (2001), suburbanization, decentralization, and people's preferences of driving private automobiles and living in single-family houses is a natural phenomenon, fitting the market economic laws. It is impossible for transit-oriented development (TOD) to solve urban transportation problems. Public transit only plays a secondary, supplemental role in urban transportation.
In summer, so far there is no consensus on the effects of mixed use on travel. It looks like this situation will go on in the future.

Methodology

Data Sources

This study uses Richmond City of Virginia as the study area (its geographic boundary and basic facts relevant to this study will be described in Section 4) with the following data sources: The 2004 land use GIS shapefile from the City of Richmond GIS team; and The 2008 home based work and home-based other trip rates (person trips/household) from the Richmond / Tri-Cities Travel Demand Forecasting Model of the Virginia Department of Transportation.

Methodologically, this study involves three parts: the first part is the calculation of land use mixture by entropy index; the second part is the calculation of land use mixture by dissimilarity index; and the last part is the correlation analysis among home-based trip rates, land use mixture indices, and socioeconomic variables, followed by regression analysis among these variables. Based on this empirical study, the research findings will be summarized and conclusions will be drawn. The literature review suggests that so far no work has been done on home-based trip rates and its relationship with land-use mixture as well as socioeconomic variables. Therefore, this study represents a new contribution to the literature.

Definition and Computing Procedures of Entropy Index

Definition of Entropy Index. According to Boarnet (2011), entropy index is the most widely accepted and commonly used index for representing land-use mixture. It quantifies the heterogeneity of land uses within a given area (such as a traffic analysis zone, or TAZ). While the original formula created by Frank and Pivo (1994) was a logarithmic function using 10 as its basis, the entropy formula was later simplified as follows:

$$\text{Entropy} = [-\sum P_j * \text{LN}(P_j)]/\text{LN}(k)$$

Where

P_j = the proportion of land area in the j^{th} land use type;
k = the number of land uses; and
LN = natural logarithm using e (approximately 2.718) as its basis.

It is noticed that the negative sign is placed before sigma symbol (∑), which converts the index's negative value to positive value. Also note that the logarithmic function of P_j, LN(P_j), returns the relative weight/importance of category j^{th} land use type within the region. The resulting value of entropy index is between 0 and 1, where 0 represents no variability of land uses within one area (total homogeneity) and 1 represents the highest variability (total heterogeneity). With respect to the input data format, entropy index uses vector data.

Computing Procedures of Entropy Index. *Identify Parcel Lots.* This step involves a pre-process to identify every parcel of land using a unique identification number and land-use code:

- Obtain the shapefile of existing land-use data (polygon features) from the Richmond GIS Department;
- Convert the polygon-feature data to centroids using XtoolsPro[1)]. As shown in Figure 1, the Feature Conversion/Transfer/Convert Feature functions are used to choose the land-use code (Field name - GENERALLU in this case) as the ID field; and
- Join the centroid layer with the TAZ boundary layer so that the centroid data are aligned with the TAZ and land use layers.

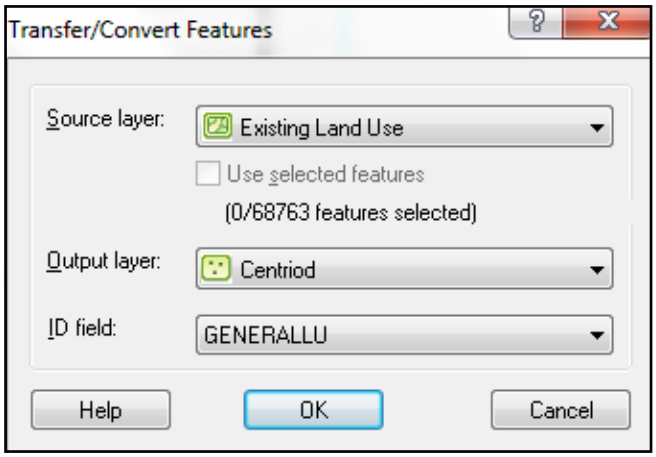


Fig.1 - **Transfer / Convert features**

Calculation of Variables

This step is to calculate the percentage of each land use category within a TAZ (P_j variable). After exporting the land use GIS shapefile to an Excel file, this paper uses an Excel Pivot Table to calculate P_j for each TAZ. The Pivot Table function also provides the number of land use categories in the TAZ (variable "*k*"). See Figure 2 for details.

1) XtoolsPro is an external analysis tool for ArcGIS.

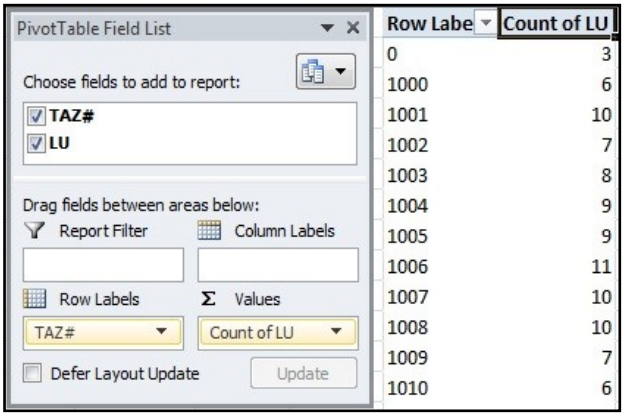


Fig. 2 - **Variable "k" from PivotTable**

Thus far, both variables P_j and k have been identified during the first step. The next step is to complete entropy index, as shown in Table 1.

Table 1

Variables from PivotTable

TAZ	Sum of [-Pj*ln(Pj)]	Count of LU	Entropy
1000	0.774350247	6	0.415699323
1001	1.129244701	10	0.550172611
1002	0.844791755	7	0.427299841
1003	0.807503965	8	0.381757365
1004	1.046380603	9	0.501947988
1005	1.189244507	9	0.620955391
1006	1.233639186	11	0.559856507
1007	1.236538949	10	0.574144295
1008	1.409392766	10	0.665042012

Definition and Computing Procedures of Dissimilarity Index

Definition of Dissimilarity Index. Entropy index is designed to measure the degree of mixing within a neighborhood, which typically has a buffer zone of less than one-half mile radius (Cervero and Kockelman 1997, D'Sousa et al. 2010). Therefore, it may not be suitable for the larger neighborhood beyond the one-half mile radius.

Recognizing entropy index's limitation, Cervero and Kockelman (1997) developed a new diversity index, i.e., dissimilarity index, which is not restricted by the size of the neighborhood. Dissimilarity index is used to calculate the land-use mixture using many small grid cells. Each grid cell has the size of a hectare (10,000 square meters, 100 meters * 100 meters).

Dissimilarity index is calculated using the following equation:

$$\text{Dissimilarity} = \sum_j^k \sum_1^8 (X_i/8)]/K$$

Where

K = number of actively developed grid-cells in the larger geographic area; and
X_i = 1 if abutting grid cells have different land uses. Otherwise, X_i = 0.

As Figure 3 shows, dissimilarity index is used to measure a 3-by-3 grid. In the top pink central cell case, if there are six neighboring cells (out of eight) with land uses that are different from the pink central cell, then the pink central cell gets 6/8 points. Following the same reasoning, the bottom green central cell outlined by the red frame is allocated 3/8 points because only three neighboring cells have different land uses.

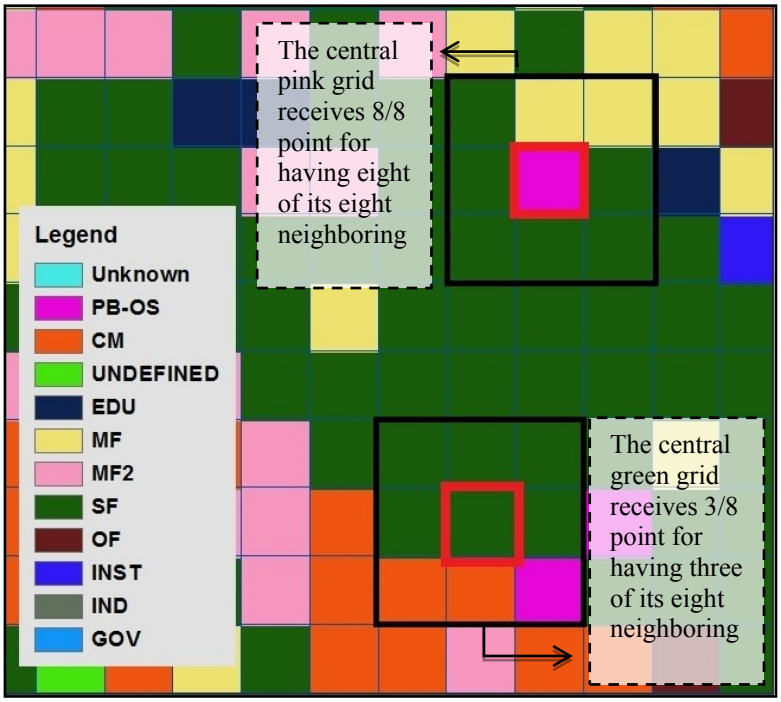


Fig. 3 - **Computation of Dissimilarity Index**

Similar to entropy index, dissimilarity index also ranges from 0 to 1. The higher the value of dissimilarity index represents, the higher the variability of land uses. However, because it uses finer-grained cells (raster data format) rather than parcel lots (vector data format) as the unit of analysis, dissimilarity index is believed to present more accurate information about the type or intensity of mixing compared to entropy index.

Computing Procedures of Dissimilarity Index. *Create a Fishnet with 100 Meters ×100 Meters Grid Cells.* While the vector data of land use parcel is used in computing entropy index, the hectare grid cell is used as the unit of analysis in computing dissimilarity index. Therefore, a layer of hectare grid cells is needed to cover the entire study area.

First, a fishnet is created using one ArcGIS tool: Arc Toolbox/Data Management Tool/Feature Class/Create Fishnet. The fishnet consists of 100 meters ×100 meters grid cells (i.e., 328.08 feet × 328.08 feet shown in Figure 4). The net of 100 meters ×100 meters grid cells is a feature

class (vector data format), which resembles a fishnet. Therefore, every polygon formed by the 100 meters ×100 meters grid cell has its own object ID (OID) and spatial attributes.

Second, an additional ID field named "Uni_ID" is inserted in the fishnet layer in order to identify each grid cell. Although every object in the feature layer already has an OID, a subsequent spatial join[2)] process between two objects may alter the OID number. To avoid this situation, an additional ID field "Uni_ID" is inserted with the value copied from OID field. The fishnet layer of 100 meters ×100 meters grid cells is termed "100-Fishnet."

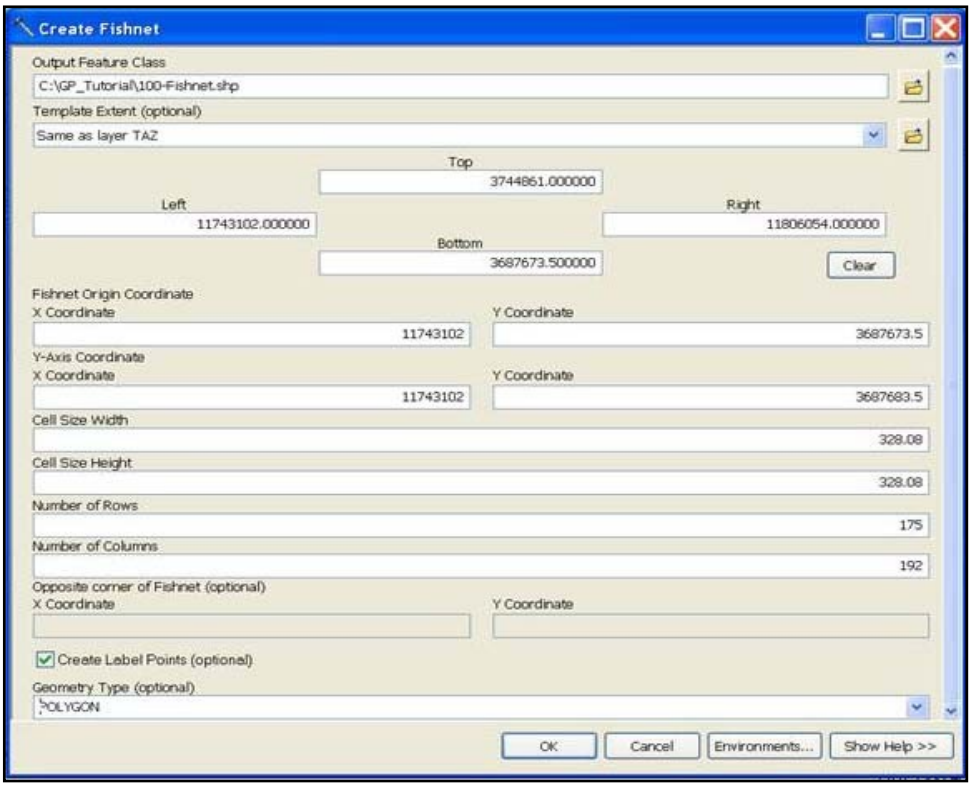


Fig. 4 – **Creation of Fishnet**

Rasterization of Land Use Layer. This step involves converting the vector layer of existing land-use to a raster layer for mapping grid cells. The ArcGIS tool is: Arc Toolbox/Conversion Tools/ To Raster/Feature to Raster. The output cell size is 10 meters ×10 meters, so it can be integrated into the 100-Fishnet layer. See Figures 5 and 6 for details.

The 100-Fishnet is a vector layer, but the 10 meters ×10 meters grid of cells is a raster layer. Since a raster layer does not contain an OID for each grid cell, which is required for calculating dissimilarity index, it is necessary to eventually create a vector layer to replace the raster layer's attributes.

2) This combines the two feature layers by integrating their attribute tables according to the relative location of the features.

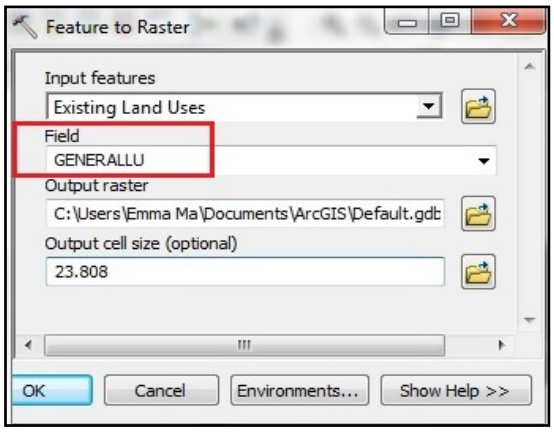
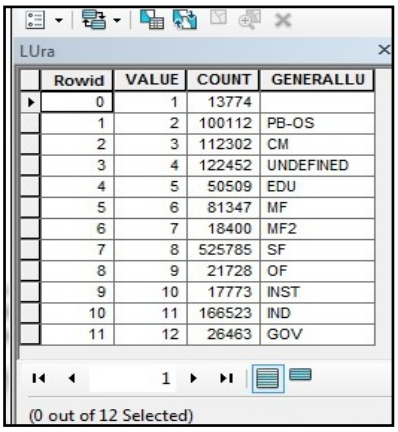


Fig. 5 - **Rasterize Land Use Layer**



Rowid	VALUE	COUNT	GENERALLU
0	1	13774	
1	2	100112	PB-OS
2	3	112302	CM
3	4	122452	UNDEFINED
4	5	50509	EDU
5	6	81347	MF
6	7	18400	MF2
7	8	525785	SF
8	9	21728	OF
9	10	17773	INST
10	11	166523	IND
11	12	26463	GOV

Fig. 6 – **Raster Attribute Table**

Transfer of the land-use information to 100-Fishnet and Conversion of Its Format from Raster Layer into Vector Layer. This step first encodes the land-use information from 10 meters × 10 meters grid-cells (raster layer) to 100-Fishnet (vector layer).

The Arc Toolbox/Spatial Analyst Tools/Zonal/Zonal Statistics tool is used to calculate the major land-use type for each hectare. The major land-use type among the 10 meters × 10 meters grid cells is chosen for each 100 meters × 100 meters grid cell (Zone).

However, the new output layer is still in raster format. The 100 meters × 100 meters grid is just a frame that allows the raster layer (10 meters × 10 meters grid) to have the same spatial layout as the 100-Fishnet layer. Figure 7 shows how this process works.

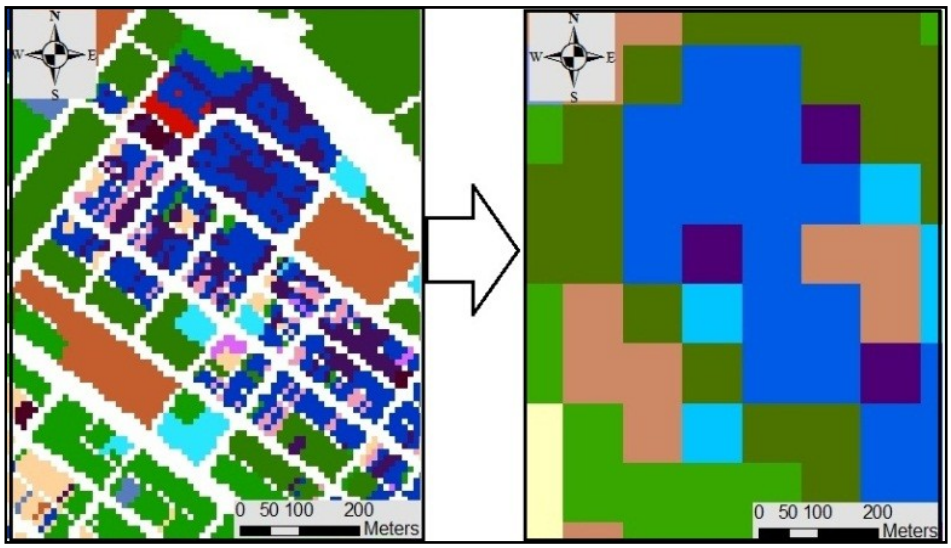


Fig. 7 - **Application of Zonal Statistics Function**

The last step is to convert the new raster layer to a vector layer using the polygon method. The ArcGIS tool is: Arc Toolbox/Conversion Tool/From Raster/Raster to Polygon. In this case, the new polygon (vector) layer is termed "Raster-Polygon."

*Identify Each 100 Meters * 100 Meters Grid Cell.* Each grid cell of the raster-polygon layer (vector) is assigned a unique ID number imported from the 100-Fishnet layer. A centroid layer is created and assigned the input feature layer as the layout of the 100-Fishnet. This action creates a centroid layer with the same layout features as the 100-Fishnet. For example, the 100-Fishnet layer is 192×175 grid cells. Therefore, the centroid layer should also have 192×175 (33,600) points.

Figure 8 illustrates how these two layers are combined to form a point-feature layer. The ArcGIS tool is: Arc Toolbox/XTools/Feature Conversions/Shapes to Centroids. The raster-polygon layer is then "spatial joined" (Arc Toolbox/Analysis Tool/Overlay/Spatial Join) to the centroids layer. Hence, the new output layer with a centroid feature is shown with information from the raster-polygon layer. The new output centroid layer in this case is called "Centroid-SP1."

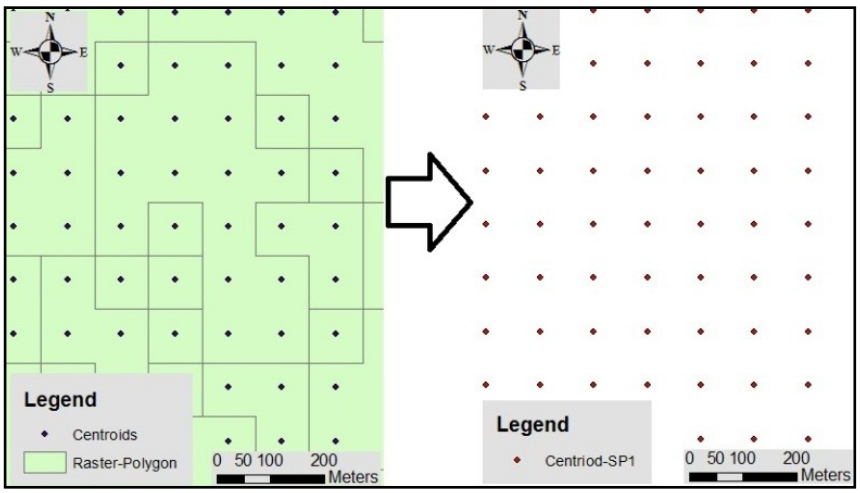


Fig. 8 - **Transformation of Centroid-SP1**

The Centroid-SP1 layer undergoes another "spatial join" with 100-Fishnet, as shown in Figure 9. The new output feature is a 100-Fishnet, called "Centroid-SP2." In this final layer, each Centroid-SP2 grid cell is encoded with the dominant land-use category.

Dissimilarity Index Calculation

Dissimilarity index is produced in Microsoft Excel because of its complex calculation requirements. After exporting the Centroid-SP2 attribute table to Excel, unnecessary fields will be deleted, leaving only the fields of "Uni_ID" and "Land Use Code (LU Code)." Recall that the index formula is $\sum_j^k \sum_1^8 (X_i/8)]/K$. The "Uni_ID" data represents each grid cell and the X_i. Each ID has a specific pattern, shown in Figure 10, which is an arithmetic progression, based on the

values of the neighboring cells. The difference of 192 is from the number of columns in the 100-Fishnet layer.

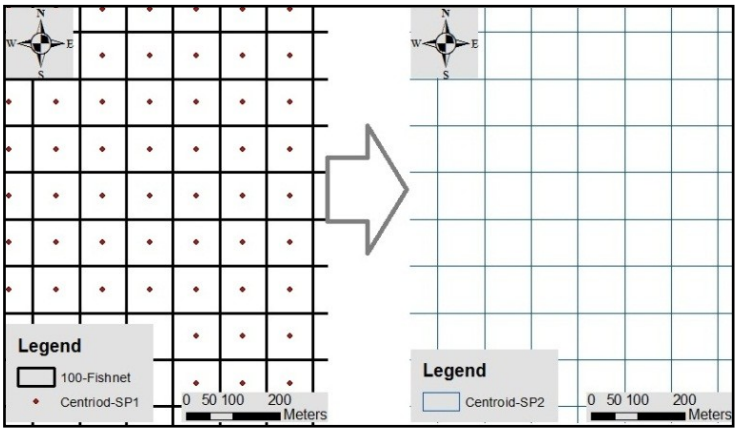
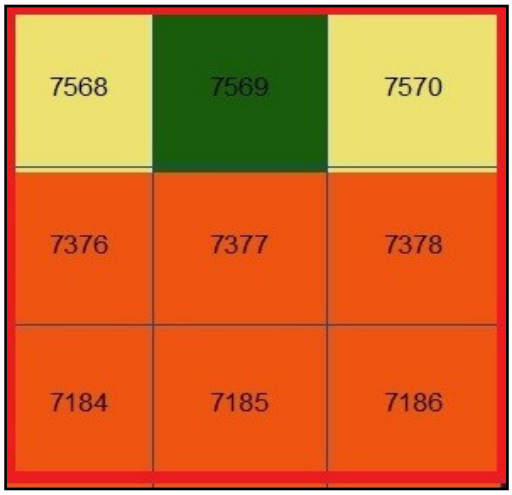


Fig. 9 - **Transformation of Centroid-SP2**



7377+191	7377+192	7377+193
7377-1	7377	7377+1
7377-193	7377-192	7377-191

Fig. 10 - **Pattern of the Cell Numbers**

As a result, this part of dissimilarity index ($\sum_1^8$ (Xi/8)) can be written using the Excel VLOOKUP[3)] function, as follows:

$\sum_1^8$ (Xi/8)=SUM(IF(B7378=(VLOOKUP(A7377-193,$A$2:$B$33601,2,FALSE)),0,1),
IF(B7377=(VLOOKUP(A7377-192,$A$2:$B$33601,2,FALSE)),0,1),

3) An Excel function is used to search and return a required value in the same column.

```
IF(B7377=(VLOOKUP(A7377-191,$A$2:$B$33601,2,FALSE)),0,1),
IF(B7377=(VLOOKUP(A7377-1,$A$2:$B$33601,2,FALSE)),0,1),
IF(B7377=(VLOOKUP(A7377+1,$A$2:$B$33601,2,FALSE)),0,1),
IF(B7377=(VLOOKUP(A7377+193,$A$2:$B$33601,2,FALSE)),0,1),
IF(B7377=(VLOOKUP(A7377+192,$A$2:$B$33601,2,FALSE)),0,1),
IF(B7377=(VLOOKUP(A7377+191,$A$2:$B$33601,2,FALSE)),0,1))/8
```

The next step is to calculate **K** (the number of developed grid-cells in the TAZ). The Pivot Table tool in Excel is used to calculate the count of Uni_ID and the sum of dissimilarity index for each TAZ. To complete the index computation, the "sum of dissimilarity" is divided by the "count of Uni_ID." All the index results are between 0 and 1.

Statistical Analysis

The statistical analysis portion of this paper consists of two components.

The first component is the correlation analysis among home-based trip rates, land-use mixture indices (entropy and dissimilarity), and socioeconomic variables. This will reveal the one-on-one relationship between each pair of variables.

The second component is the multivariate regression analysis, which shows the combined effects of multiple independent variables (predictors) on a dependent variable (in this case, it is home-based work trip rate and home-based other trip rate). The independent variables not only include entropy and dissimilarity indices, which measure land-use mixture, but also additional socioeconomic variables [population/acre, auto/acre, population/household (HH), auto/ household (HH)]. In this way, the regression results will help determine whether land-use mixture variables or socioeconomic density variables at traffic analysis zone level and household level have larger effects on home-based trip making.

Since this study is a cross-sectional analysis using traffic analysis zone (TAZ) as a basic unit of analysis, it cannot definitively answer the causality question.

Richmond, Virginia: An Overview

Geographic Location

Figure 11 shows Richmond City (red colored) and its surrounding counties. Located approximately 100 miles south of Washington D.C., Richmond City is the capital city of the Commonwealth of Virginia, adjoining Henrico County and Chesterfield County.

Demography

In the year 2011, Richmond City had 201,828 residents and 166,384 employees. There were 93,837 workers living in the city and 160,603 workers working in the city. The daytime population was 268,594 people, calculated as: Total resident population + Total workers working in area - Total workers living in area. Therefore, the employment residence ratio was as low as 1.71 (Total workers working in the area / Total workers living in the area) (Source: American FactFinder 2011).

Bordered by Interstates 95, 64, and 195 (Downtown Expressway), the downtown area (central business district or CBD) is the heartland of Richmond. The majority of the population is

clustered around CBD. As shown in Figure 12, the Fan District west of the downtown area has the highest population density.

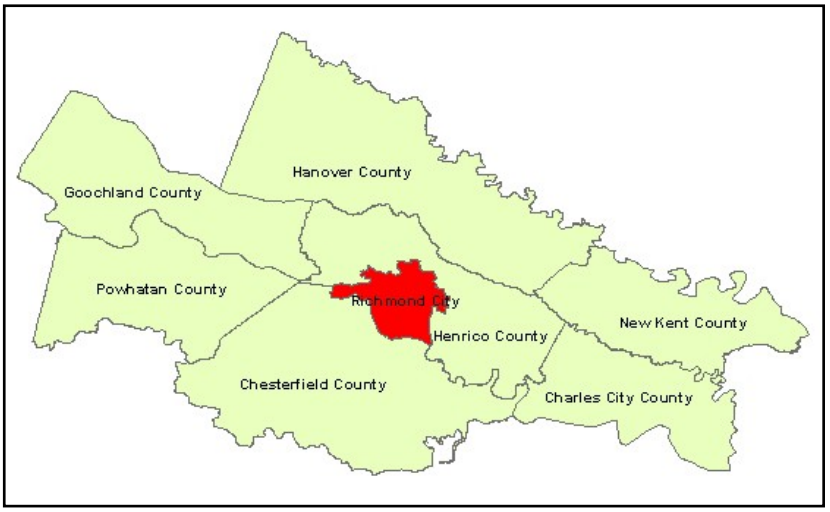


Fig. 11 - **Richmond City and Its Surrounding Counties**

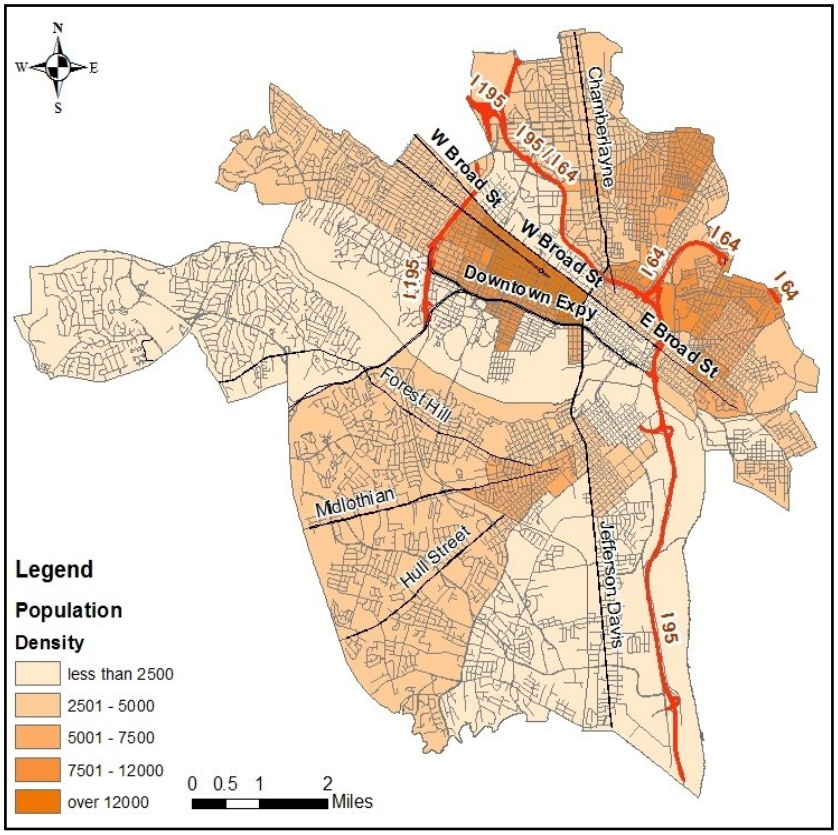


Fig. 12 - **Population Density Distribution**

According to the Richmond Strategic Multimodal Transportation Plan, the densest employment area is within the CBD. That plan also indicates that the retail areas of Carytown (Note: Carytown is an urban retail district lining Cary Street at the southern end of the Museum District in Richmond, Virginia.The district includes over 300 shops, restaurants, and offices.), Southside Plaza [Note: Southside Plaza is a strip mall on Richmond's south side (south of the James River). Its principal tenants are Farmer's Foods and CVS drug & pharmacy among smaller stores.], and the fragmented industrial areas located south of the James River all contain sites that provide a relatively large number of jobs, with the employment density of more than 10 jobs per acre (Source: http://www.yesrichmondva.com/transportation-development/Richmond-Strategic-Multi-Modal-Transportation). See Figure 13 for Carytown and Southside Plaza.

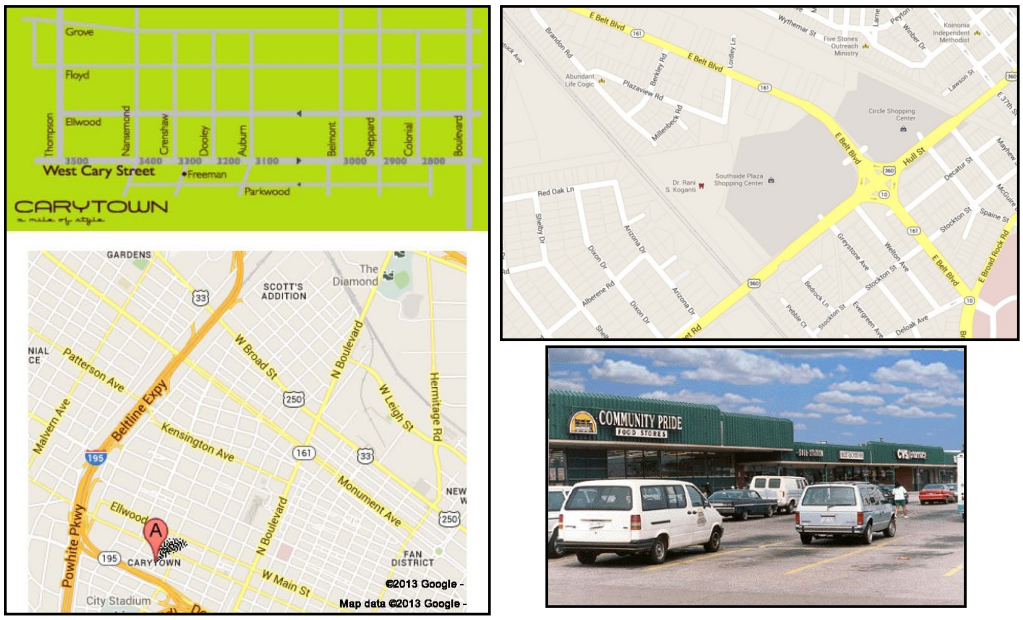


Fig. 13 – **Carytown (Left) and Southside Plaza (Right)**

Land Use

The types of general land-use impact the pattern of local travel behavior. The land in the CBD has various uses, the majority of which are commercial and official uses. Throughout the city, the commercial land uses are located along several primary streets and areas, such as West and East Broad Streets, and the area within Belvidere Boulevard (a major street linking Chamberlayne Avenue and Jefferson Davis Highway, unlabeled in Figure 14) and, I-95, I-64, and I-195. South of the city, the commercial functions are found linearly along Midlothian Turnpike, Hull Street, and Jefferson Davis Highway.

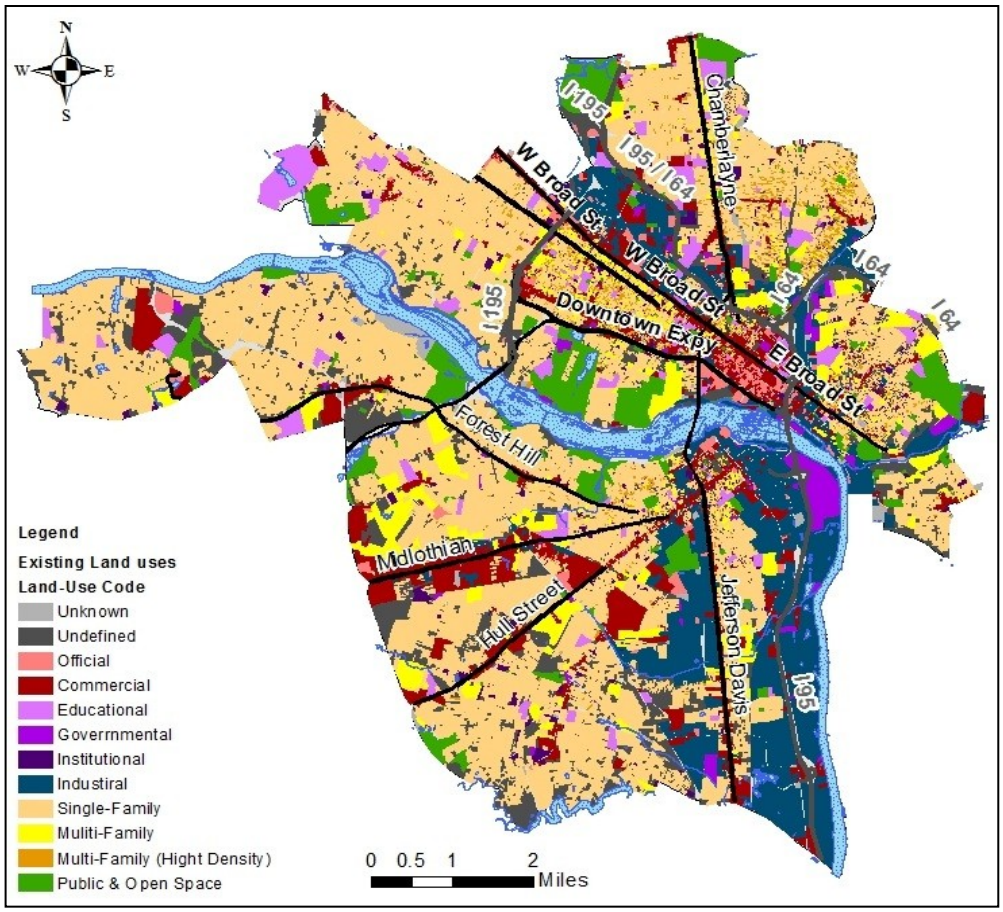


Fig. 14 - **Existing Land Uses**

Outside of the downtown (commercial and official land uses) and the southeast area (industrial land uses), single-family residential housing comprises the majority of the total developed land, up to 41.8% within the city's walking and bicycle paths.

Poverty

Figure 15 shows the 1999 low-income population distribution in the Richmond metropolitan area, which contains Richmond City as the central city. It clearly shows that the poorest areas are concentrated in and near CBD area, including North Side, East End, and South Side.

The urban fringe areas and suburban counties had much lower percent of population under poverty. This pattern is consistent with that of the other metropolitan areas in the country.

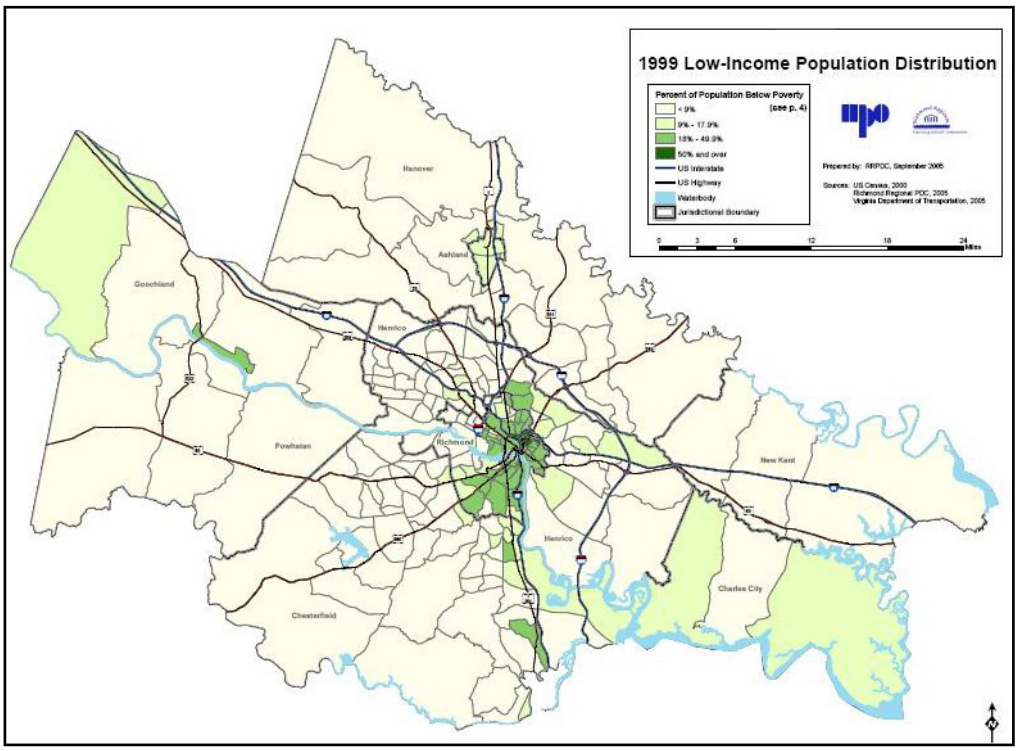


Fig. 15 – **1999 Richmond Low-Income Population Distribution**

Transportation

The James River runs through the center of the city. Interstates 95 and 64 intersect in the downtown area, and Interstate 195 and Virginia State Route 288 separately encircle the east and west sides of the city.

Like in the rest of the U.S., automobile is the principal transportation means for the Richmond residents. Table 2 shows the modeled 2008 modal shares for the total daily trips occurring in the entire Richmond/Tri-Cities Model Region, which includes the following list of jurisdictions: Chesterfield, Colonial Heights, Hanover, Henrico, Hopewell, Richmond, Petersburg, Charles City (partial), Dinwiddie (partial), Goochland (partial), New Kent (partial), Powhatan (partial), Prince George (partial). Figure 16 shows the Richmond/Tri-Cities Model Region. The entire Model Region currently has about 1.2 million population, about six times as large as its central city's population. According to the model estimate, automobiles had more than 98% of the total regional modal share.

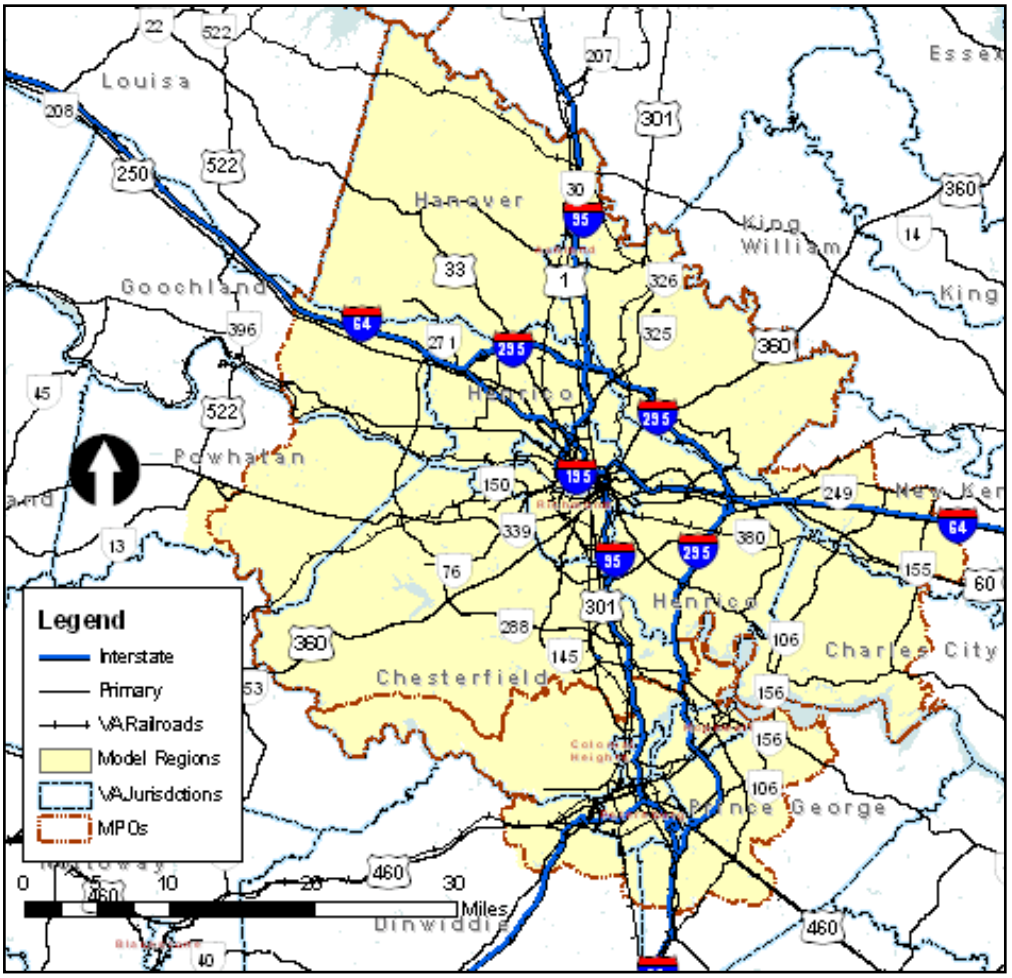


Fig. 16 - **The Richmond/Tri-Cities Model Region**

However, for Richmond City, the modal share is very different from that of the region, with a much higher transit modal share for its commuting workers (7%). According to the 2007-2011 American Community Survey 5-Year Estimates, Richmond City had the following modal shares for its commuting workers 16 years and over (total number is 94,373). See Table 3 for details.

Table 2

2008 Regional Modal Shares

Trip Purpose	Total Person Trips	Auto Person Trips		Transit Person Trips	
		Number of Trips	Percent	Number of Trips	Percent
All	3,184,052	3,139,666	98.6	44,386	1.4
Peak	539,809	527,721	97.8	12,088	2.2
Off-Peak	2,644,243	2,611,945	98.8	32,298	1.2
Home-Based Work	719,646	702,100	97.6	17,546	2.4
Peak	258,784	250,439	96.8	8,345	3.2
Off-Peak	460,862	451,661	98.0	9,201	2.0
Home-Based Other	1,790,111	1,767,430	98.7	22,680	1.3
Peak	214,338	211,101	98.5	3,238	1.5
Off-Peak	1,575,772	1,556,329	98.8	19,443	1.2
Non-Home Based	674,296	670,135	99.4	4,160	0.6
Peak	66,687	66,181	99.2	506	0.8
Off-Peak	607,608	603,954	99.4	3,654	0.6

Source: Virginia Department of Transportation. (2008), *Richmond/Tri-Cities Transportation Model*. No

Table 3

Modal Shares of Richmond Commuting Workers

Modes	Number of Trips	Percent
Car, truck, or van -- drove alone	66,614	70.6%
Car, truck, or van -- carpooled	10,980	11.6%
Public transportation (excluding taxicab)	6,568	7.0%
Walked	4,171	4.4%
Other means	2,689	2.8%
Worked at home	3,351	3.6%

Source: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03.

When comparing Table 2 and Table 3, it should be noted that central city should have a much higher transit modal share than its suburban counterpart. In addition, commuting workers should also have much higher transit modal shares than general population. Therefore, there exists a huge discrepancy of transit modal share between the modeled Table 2 and observed Table 3.

In the Richmond region, the principal transit operator is the Greater Richmond Transit Company (GRTC), which primarily serves Richmond City. As illustrated in Figure 17, the GRTC bus stops and routes are concentrated in the northern part of the city, i.e. north of the James River (crossing the city in the central area and blue colored), especially in the downtown area. The northern part of Richmond has a better accessibility to public transportation facilities as the 0.25-mile buffer zones of the GRTC bus routes cover most of the area.

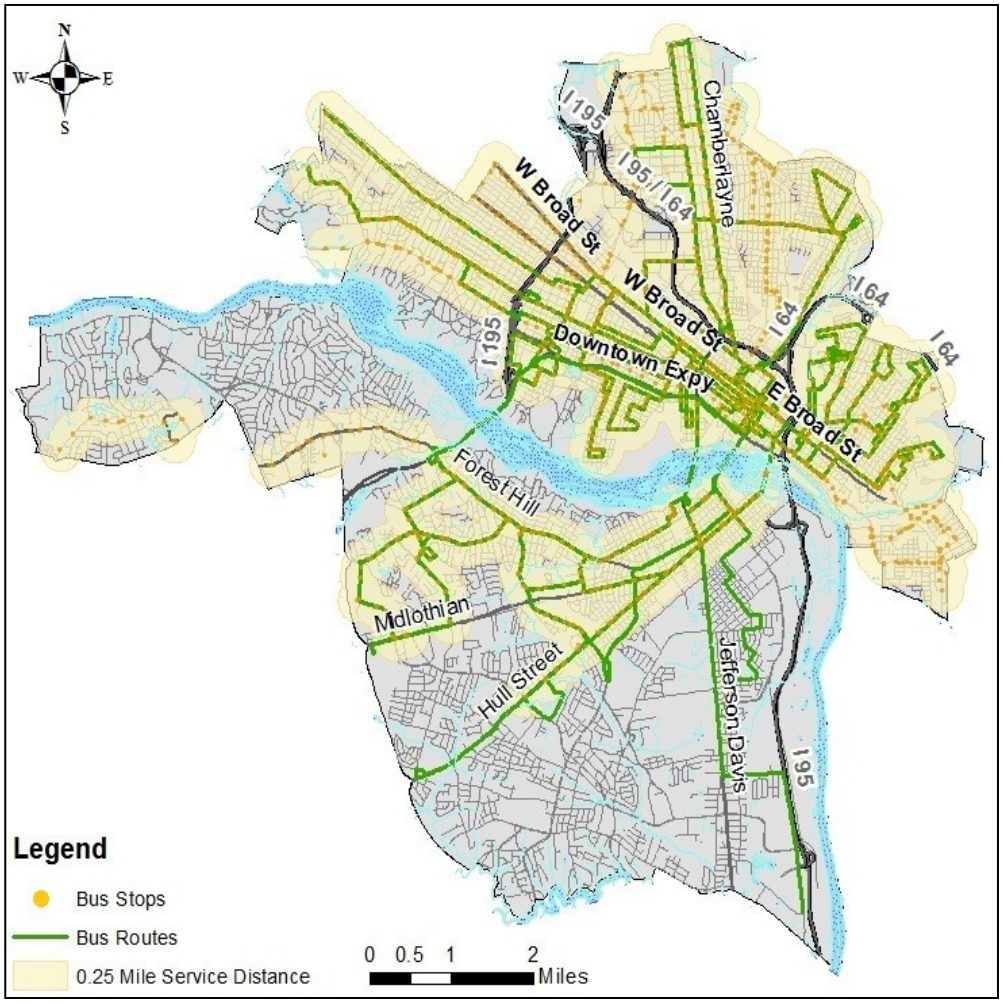


Fig. 17 - **Service Area of GRTC**

Figure 18 shows the distribution of home-based work trip rate for the city. The highest home-based work trip rates are found in a small block of the CBD, north of Broad Street, and southeast of the intersection of I-95/I-64 and I-195. The second highest rates of home-based work trips are found mostly in the residential, industrial, or commercial areas of Richmond, such as the Far West neighborhood, a partial area of the Broad Rock neighborhood between

the Jefferson Davis Highway and Midlothian Turnpike, the Woodland Heights neighborhood, etc.

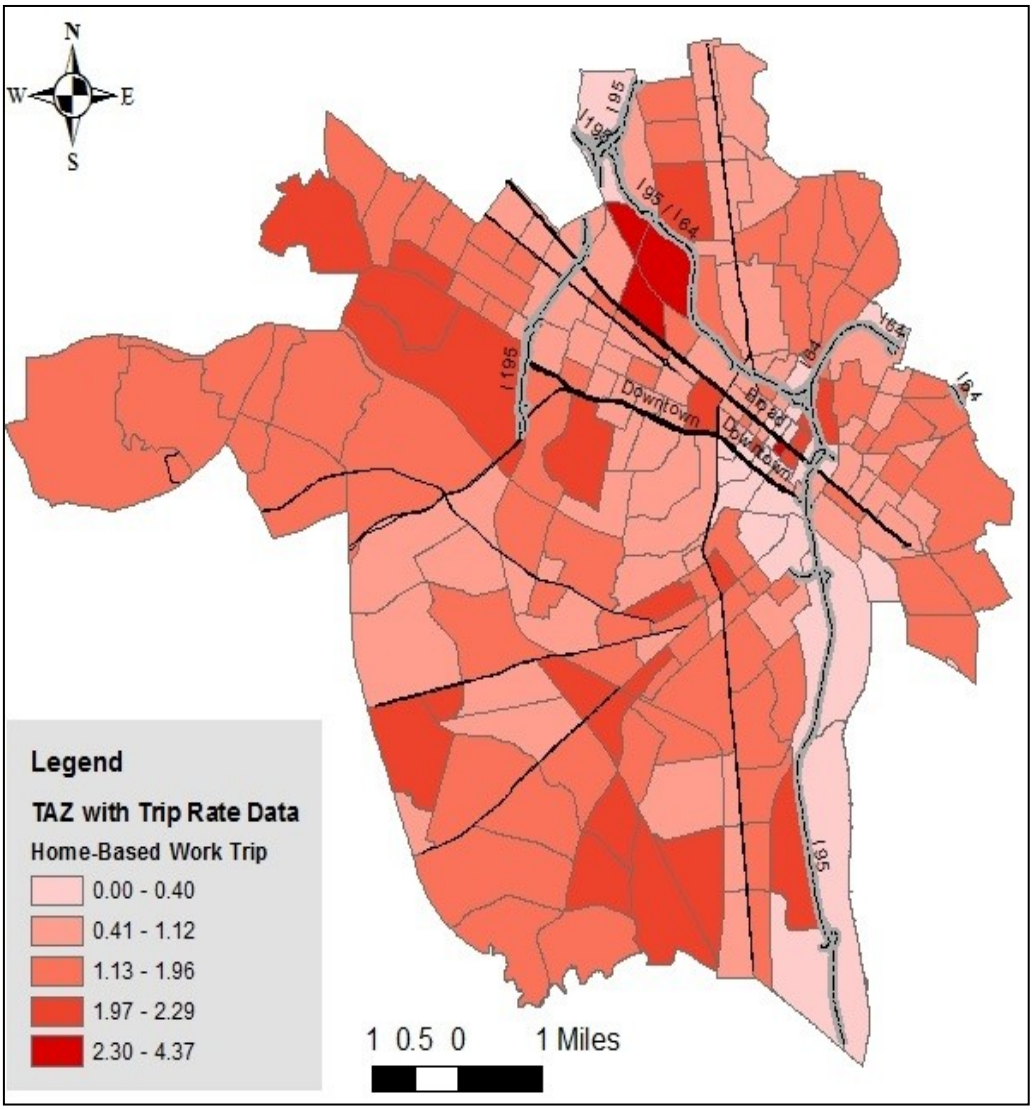


Fig. 18 - **Map of TAZs with Home-Based Work Trip Rate**

Figure 19 shows that the home-based other trips are mostly generated to the north of Broad Street, or the area between the Jefferson Davis Highway and Midlothian Turnpike. The highest home-based other trip rates are found between 7th and 12th Streets within the CBD.

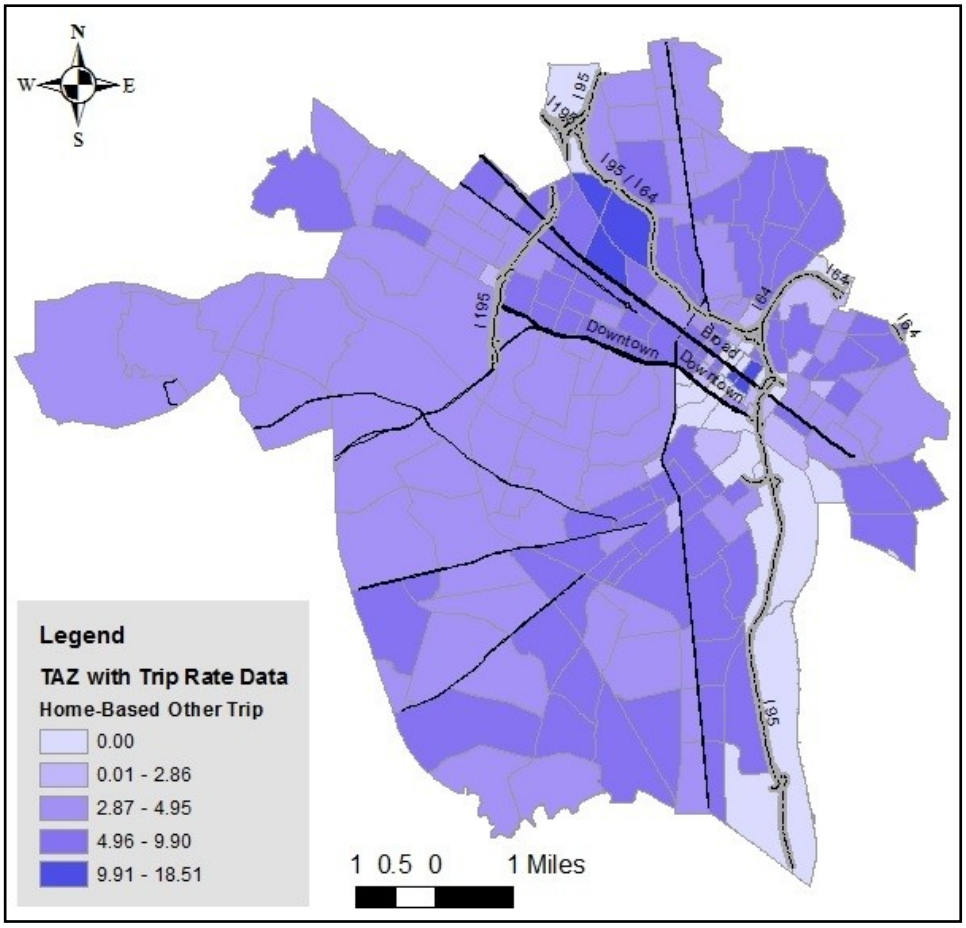


Fig. 19 - **Map of TAZs with Home-based Other Trip Rate**

Results of Analysis

This section documents and analyzes the results of computing both entropy and dissimilarity indices, and conducting correlation / regression analysis among these two indices, socioeconomic variables, and home-based trip making.

This paper uses traffic analysis zone (TAZ) in the Richmond/Tri-Cities Model as a basic unit of analysis. The computing process is also called “NEAT-GIS” (Neighborhood Environment for Active Transport – Geographic Information Systems) (D’Sousa et al. 2010). While GIS handles the geographic analysis portion of the work, calculation of the indices will be completed using Microsoft Excel. Following the computing procedures described in the Methodology Section, the results are shown below.

Entropy Index of the Richmond Land Use Mixture

Figure 20 uses a darker red color to indicate higher entropy and higher heterogeneity of land uses. It indicates that the areas with the highest mixing level or entropy value over 0.90 are located in the CBD between 7th and 9th Streets. The other areas with the high level of land-use mixture are located near the intersection of I-195 and Broad Street, and the southwest part of the City near the intersection of Forest Hill Avenue and Route-76 (Powhite Parkway). The lowest entropy areas are located in the southwest of Monument Avenue and I-195 (Downtown Expressway) with an entropy value under 0.2, where single-family residential land uses are dominant.

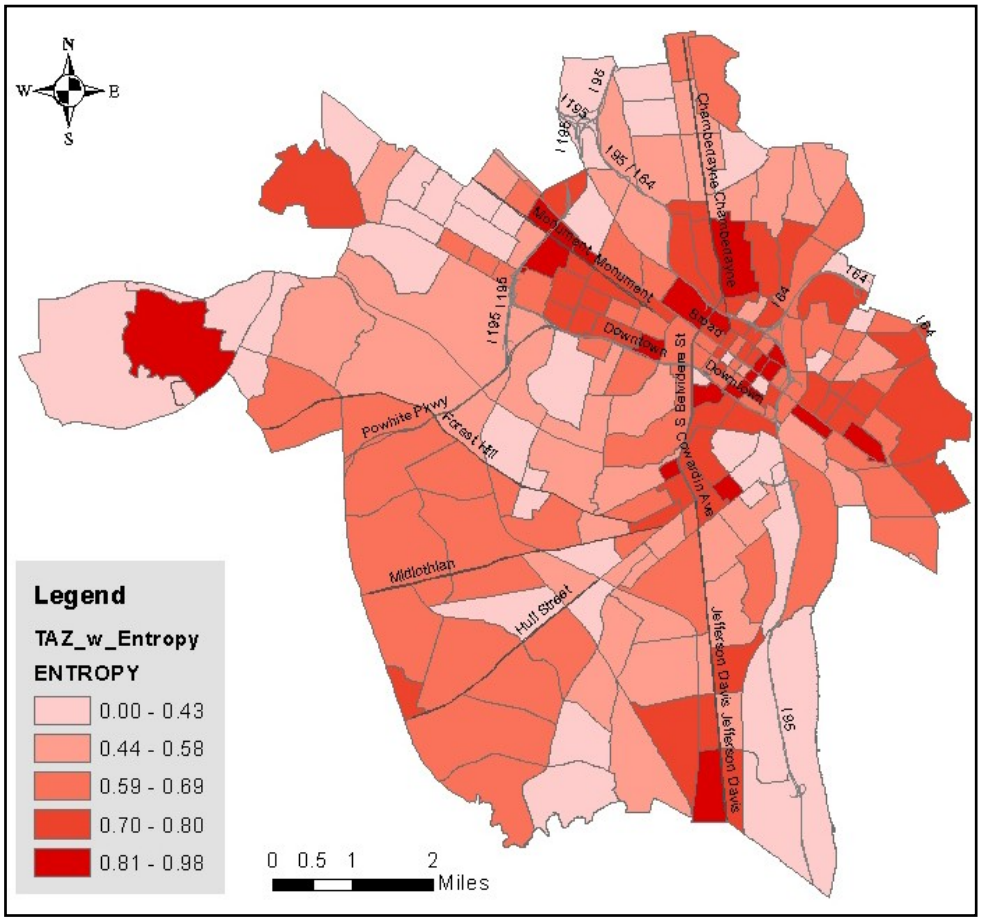


Fig. 20 – **Entropy Index in Richmond**

Dissimilarity Index of the Richmond Land Use Mixture

As illustrated in Figure 21, by using dissimilarity index as an indicator of land-use mixture, the mixed land use areas are even more clustered in the downtown area of Richmond than by

using entropy index as an indicator. In addition to downtown area, the Fan District has a very high level of land-use mixture.

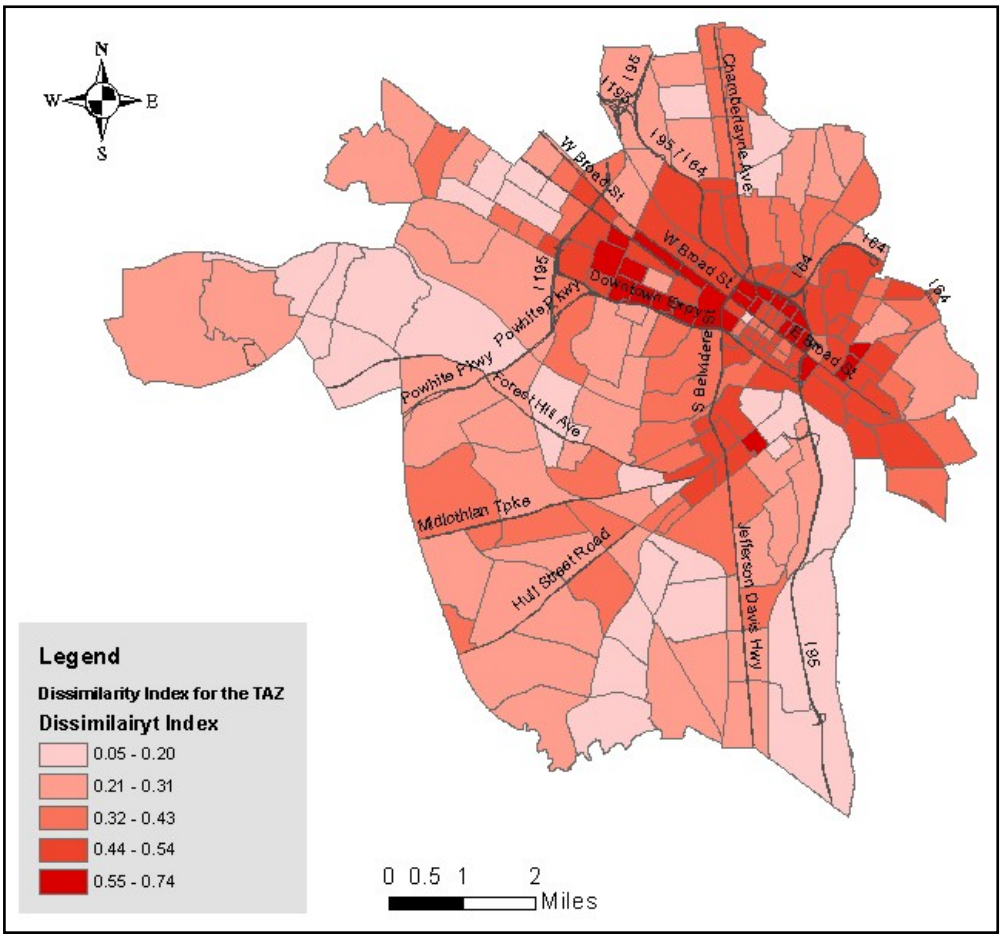


Fig. 21 – **Dissimilarity Index in Richmond**

In summary, whether using entropy index and dissimilarity index, downtown, nearby areas along Broad Street, and a few major street intersections have a relatively high level of land-use mixture. The outlying areas, especially residential areas, are more homogeneous with low level of land-use mixture.

Correlation Analysis between Home-Based Trip Rates and Land-Use Mixture Indices

This section first generates scatterplots (Fig. 22) and then conducts a correlation analysis between home-based trip rates (home-based work and home-based other) and land-use mixture indices (entropy and dissimilarity). The correlation matrix is shown in Table 4.

From Figure 22, it can easily be seen that home-based work trip rate, shown as a downward sloping line, is slightly inversely proportional to entropy and dissimilarity indices. However, home-based other trip rate, shown as a straight line, is almost completely independent of entropy and dissimilarity indices.

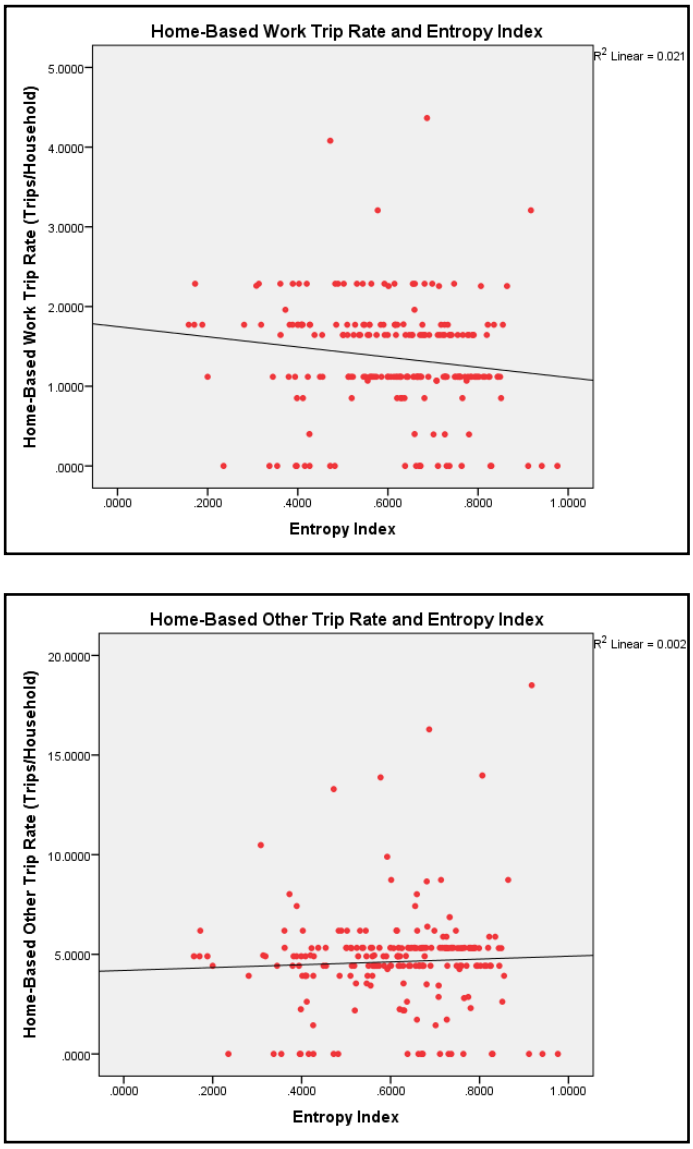


Fig. 22 – **Scatterplots of Home-Based Trip Rates and Land-Use Mixture Indices**

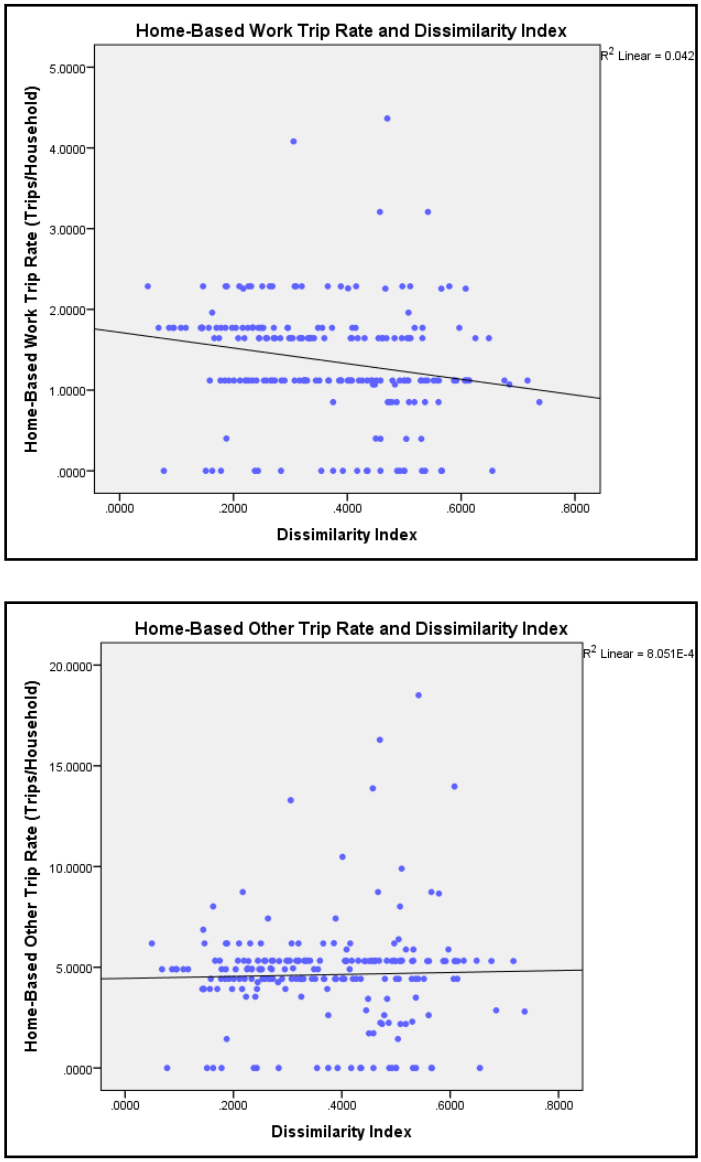


Fig. 22 – **Scatterplots of Home-Based Trip Rates and Land-Use Mixture Indices**

As shown in Table 4, entropy index and dissimilarity index are highly correlated (.700). This suggests that these two indices point to the generally same direction in measuring land-use mixture.

Table 4 indicates that home-based work trip rates are negatively correlated with either entropy

index or dissimilarity index, with the Pearson correlation coefficient (*r*) to be -.145 and -.205, respectively. This indicates that, with an increase in degree of land-use mixture (larger entropy and dissimilarity indices), there will be a decrease in home-based work trip rates, even though the correlation strength is relatively weak. That dissimilarity index is relatively more correlated with home-based work trip rates than entropy index suggests that dissimilarity index may be a better indicator to measure land-use mixture than entropy index.

Mixed land uses tend to induce more walking, cycling, or transit trips. Transit trips typically serve home-based work trip purpose occurring during peak periods. Because of this reason, land-use mixture seems to have a somewhat positive effect on the reduction of home-based work trips. This statistical analytical result corroborates Cervero's finding that although land-use mixture has a correlation to commuting, its correlation strength is not very strong (Cervero 1996).

In the meantime, home-base other trips can take place at any time. Because of this reason, land-use mixture has very limited or negligible impacts on home-based other trip rates.

Table 4

Correlation Matrix between Home-Based Trip Rates and Land-Use Mixture Indices

Correlations

		Home-Based Work Trip Rate (Trips/Household)	Home-Based Other Trip Rate (Trips/Household)	Entropy Index	Dissimilarity Index
Home-Based Work Trip Rate (Trips/Household)	Pearson Correlation	1	.873**	-.145*	-.205**
	Sig. (2-tailed)		.000	.033	.002
	N	216	216	216	216
Home-Based Other Trip Rate (Trips/Household)	Pearson Correlation	.873**	1	.045	.028
	Sig. (2-tailed)	.000		.514	.678
	N	216	216	216	216
Entropy Index	Pearson Correlation	-.145*	.045	1	.700**
	Sig. (2-tailed)	.033	.514		.000
	N	216	216	216	216
Dissimilarity Index	Pearson Correlation	-.205**	.028	.700**	1
	Sig. (2-tailed)	.002	.678	.000	
	N	216	216	216	216

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation Analysis between Home-Based Trip Rates and Socioeconomic Variables

Cervero further argues that, besides land-use mixture, neighborhood density and automobile availability are the main factors influencing the commuting choice of residents (Cervero 1996).

In another paper, Chen and Suen (2010) indicated that, in Richmond, socioeconomic variables have larger impacts on travel making and mode choices than land use variables. To test the validity of both arguments, this section will conduct additional correlation analysis between home-based trip rates and zonal/household socioeconomic variables.

Due to the data limitation, only two trip production-sided socioeconomic variables are used: population and auto. For zonal analysis, two density-related variables are calculated: population/acre and auto/acre. For household analysis, two household-related variables are calculated: population/HH and autos/HH. Therefore, zonal analysis uses acres as an areal unit, whereas household analysis uses household as unit. Figures 23 and 24 show that household-related variables, especially auto per household, are more closely related to home-based trip rates than zonal density-related variables.

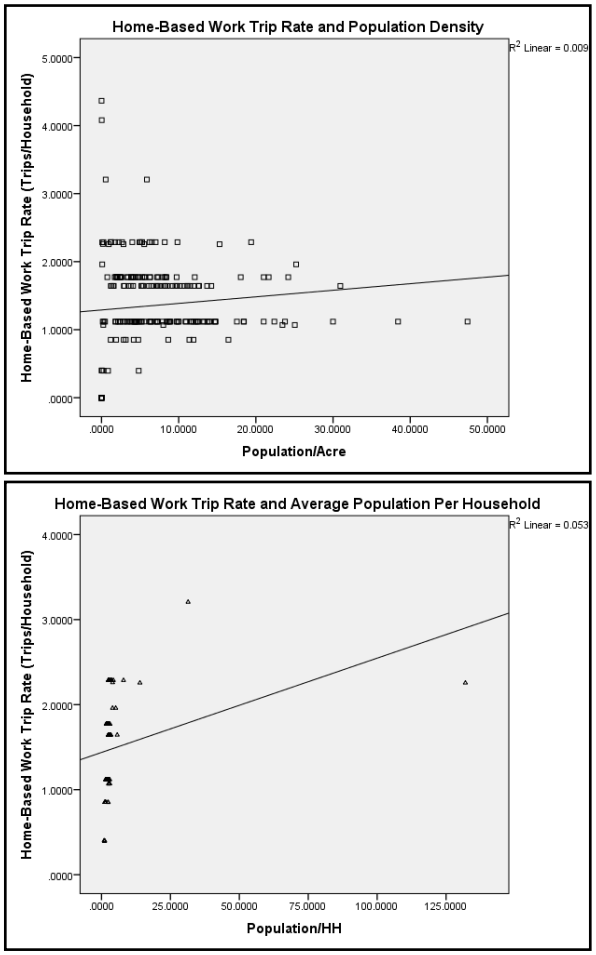
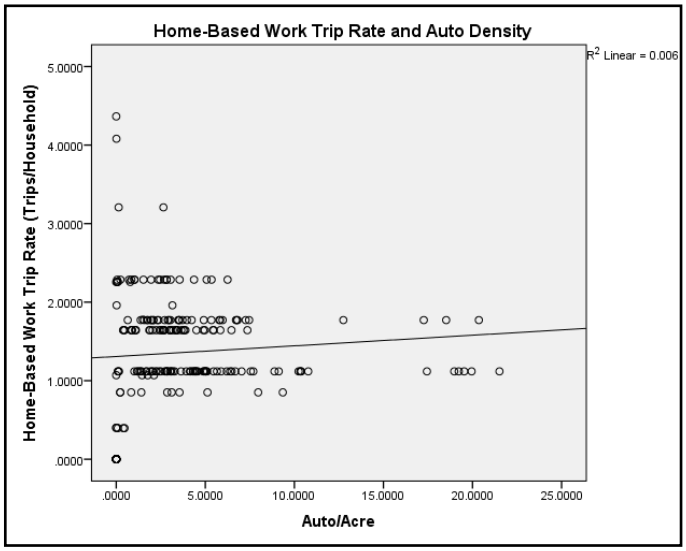


Fig. 23 – **Home-Based Work Trip Rate and Socioeconomic Variables**



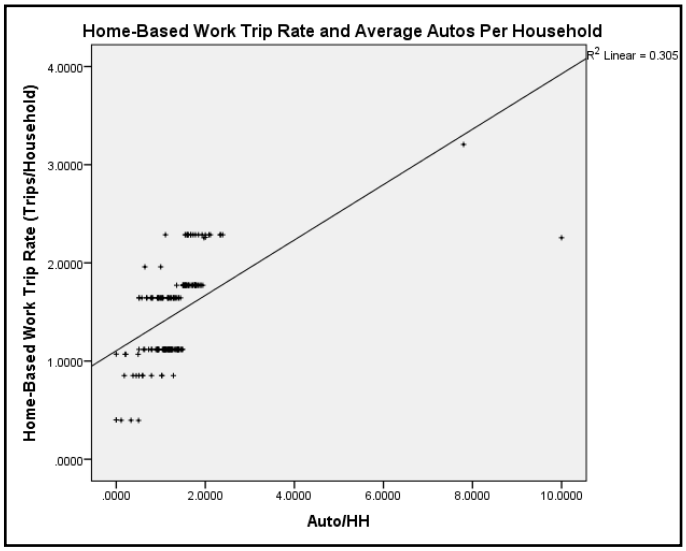


Fig. 23 – **Home-Based Work Trip Rate and Socioeconomic Variables**

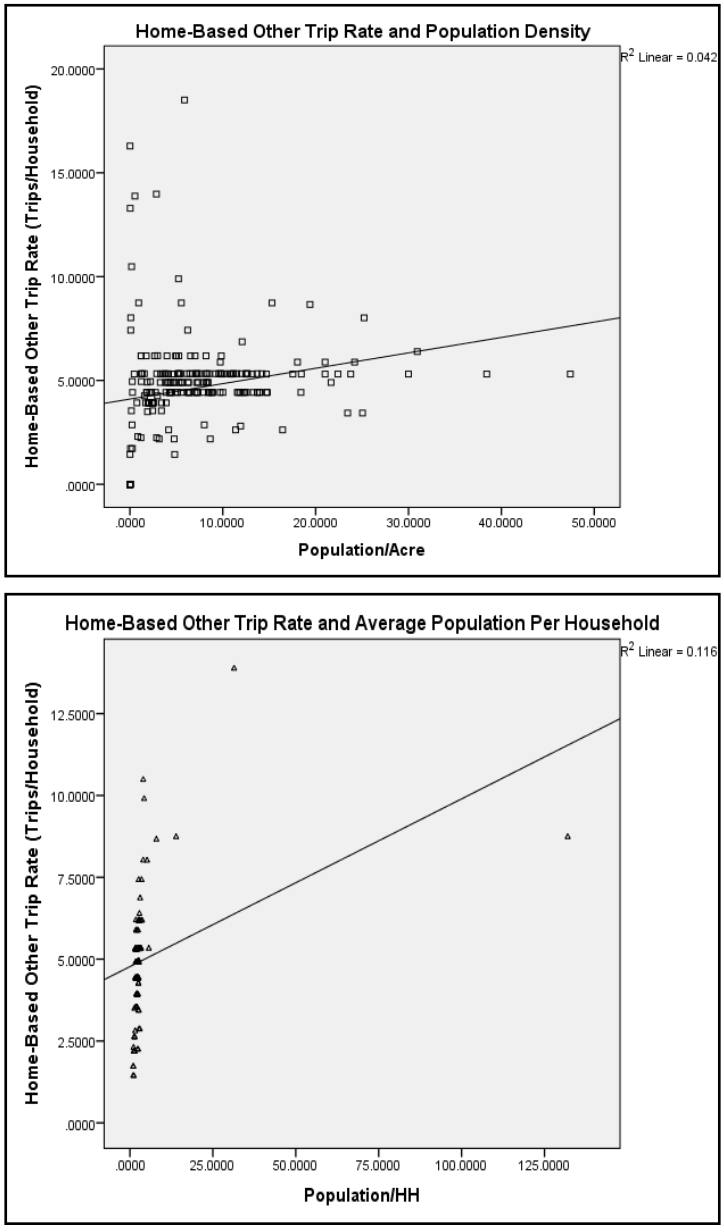


Fig. 24 – **Home-Based Other Trip Rate and Socioeconomic Variables**

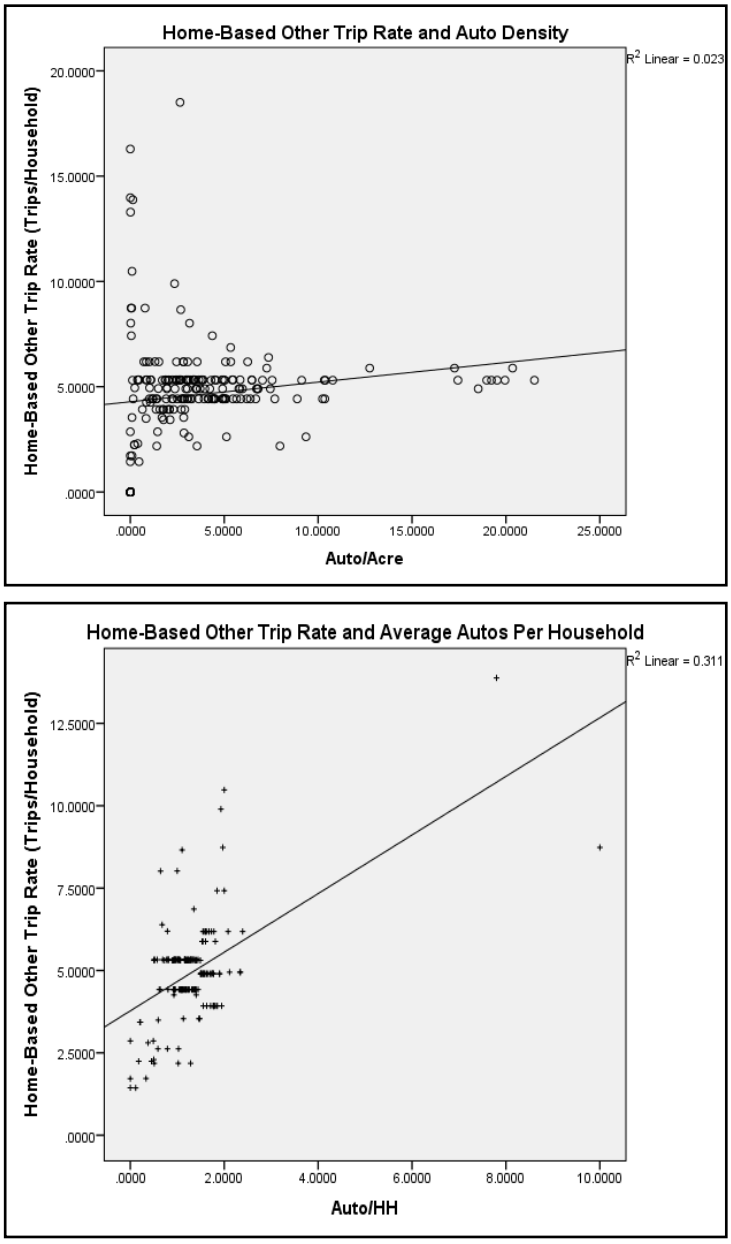


Fig. 24 – **Home-Based Other Trip Rate and Socioeconomic Variables**

Table 5 is the correlation matrix between home-based trip rates and zonal socioeconomic variables. It clearly indicates that home-based trip rates and zonal socioeconomic variables are

Table 5

Correlation Matrix between Home-Based Trip Rates and Zonal Socioeconomic Variables

Correlations

		Home-Based Work Trip Rate (Trips/Household)	Home-Based Other Trip Rate (Trips/Household)	Population/Acre	Auto/Acre
Home-Based Work Trip Rate (Trips/Household)	Pearson Correlation	1	.873**	.097	.079
	Sig. (2-tailed)		.000	.154	.246
	N	216	216	216	216
Home-Based Other Trip Rate (Trips/Household)	Pearson Correlation	.873**	1	.206**	.150*
	Sig. (2-tailed)	.000		.002	.027
	N	216	216	216	216
Population/Acre	Pearson Correlation	.097	.206**	1	.828**
	Sig. (2-tailed)	.154	.002		.000
	N	216	216	216	216
Auto/Acre	Pearson Correlation	.079	.150*	.828**	1
	Sig. (2-tailed)	.246	.027	.000	
	N	216	216	216	216

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6

Correlation Matrix between Home-Based Trip Rates and Household Socioeconomic Variables

Correlations

		Home-Based Work Trip Rate (Trips/Household)	Home-Based Other Trip Rate (Trips/Household)	Population/HH	Auto/HH
Home-Based Work Trip Rate (Trips/Household)	Pearson Correlation	1	.873**	.230**	.552**
	Sig. (2-tailed)		.000	.001	.000
	N	216	216	188	188
Home-Based Other Trip Rate (Trips/Household)	Pearson Correlation	.873**	1	.340**	.557**
	Sig. (2-tailed)	.000		.000	.000
	N	216	216	188	188
Population/HH	Pearson Correlation	.230**	.340**	1	.796**
	Sig. (2-tailed)	.001	.000		.000
	N	188	188	188	188
Auto/HH	Pearson Correlation	.552**	.557**	.796**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	188	188	188	188

**. Correlation is significant at the 0.01 level (2-tailed).

largely independent of each other with very low and negligible correlation. This means that the socioeconomic variables in surrounding areas have very little effects on home-based trip making behaviors.

Table 6 is the correlation matrix between home-based trip rates and household socioeconomic variables. This table presents the opposite results from those of Table 5. It is particularly worth noting that autos/HH is highly correlated with home-based work trip rates (.552) and home-based other trip rates (.557).

Regression Analysis of Home-Based Work Trip Rates

In this analysis, the following variables are assumed:

Dependent variable = home-based work trip rate; and
Independent variables = Entropy index, Dissimilarity index, Population/Acre, Auto/Acre, Population/HH, Auto/HH.

The multivariate regression results are shown in Table 7. The entire model performs well with a good R^2 value (.522). ANOVA results also confirm that the model is significant with a large F value.

In terms of contributions from independent variables (predictors), Auto/HH is apparently the most significant variable impacting home-based work trip rate with the highest t value (11.189). Both Entropy index and Dissimilarity index are negatively related to home-based work trip rate, but Dissimilarity index is much more significant than Entropy index in impacting home-based work trip rate. Entropy index is actually insignificant with a very small t value (-.260).

These findings from the regression analysis are consistent with those from the correlation analysis.

Regression Analysis of Home-Based Other Trip Rates

With respect to the analysis on home-based other trip rate, the following variables are assumed:

Dependent variable = home-based other trip rate; and
Independent variables = Entropy index, Dissimilarity index, Population/Acre, Auto/Acre, Population/HH, Auto/HH. The multivariate regression results are shown in Table 8.

Like home-based work trip rate model, the entire model for home-based other trip rate performs well with a good R^2 value (.459). ANOVA results also confirm that the model is significant with a large F value.

In terms of contributions from independent variables (predictors), Auto/HH is still the most significant variable impacting home-based other trip rate with a high t value of 10.366. However, both Entropy index and Dissimilarity index are insignificant with very small t values (.490 and .873, respectively).

These findings from the regression analysis are also consistent with those from the correlation analysis.

Table 7

Multivariate Regression Results of Home-Based Work Trip Rate

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723[a]	.522	.506	.3297901

a. Predictors: (Constant), Auto/HH, Auto/Acre, Entropy Index, Dissimilarity Index, Population/HH, Population/Acre

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.526	6	3.588	32.986	.000[b]
	Residual	19.686	181	.109		
	Total	41.212	187			

a. Dependent Variable: Home-Based Work Trip Rate (Trips/Household)

b. Predictors: (Constant), Auto/HH, Auto/Acre, Entropy Index, Dissimilarity Index, Population/HH, Population/Acre

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.029	.130		7.930	.000
	Entropy Index	-.057	.219	-.019	-.260	.795
	Dissimilarity Index	-.516	.237	-.163	-2.180	.031
	Population/Acre	.032	.007	.478	4.728	.000
	Auto/Acre	-.056	.011	-.499	-5.043	.000
	Population/HH	-.032	.005	-.673	-6.922	.000
	Auto/HH	.577	.052	1.130	11.189	.000

a. Dependent Variable: Home-Based Work Trip Rate (Trips/Household)

Table 8

Multivariate Regression Results of Home-Based Other Trip Rate

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.678[a]	.459	.441	1.0959967

a. Predictors: (Constant), Auto/HH, Auto/Acre, Entropy Index, Dissimilarity Index, Population/HH, Population/Acre

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	184.708	6	30.785	25.628	.000[b]
	Residual	217.419	181	1.201		
	Total	402.127	187			

a. Dependent Variable: Home-Based Other Trip Rate (Trips/Household)

b. Predictors: (Constant), Auto/HH, Auto/Acre, Entropy Index, Dissimilarity Index, Population/HH, Population/Acre

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.121	.431		4.916	.000
	Entropy Index	.357	.729	.037	.490	.625
	Dissimilarity Index	.687	.787	.070	.873	.384
	Population/Acre	.129	.022	.625	5.820	.000
	Auto/Acre	-.174	.037	-.498	-4.730	.000
	Population/HH	-.083	.016	-.550	-5.310	.000
	Auto/HH	1.778	.172	1.114	10.366	.000

a. Dependent Variable: Home-Based Other Trip Rate (Trips/Household)

Conclusion

Through this empirical study of Richmond, Virginia, it has been found that:

First, land-use mixture has some but not strong positive effects on home-based work trip rate, but has virtually no or negligible effects on home-based other trip rate.

Second, socioeconomic characteristics in larger surrounding areas have very little effects on home-based trip making.

Third, household socioeconomic characteristics have direct and positive effects on home-based trip making, especially auto ownership variable, which is positively related to home-based trip rate.

Fourth, both correlation analysis and regression analysis have yielded the generally consistent findings.

In conclusion, the link between home-based trip making and land-use mixture is still far from clear, requiring more in-depth and detailed analysis at different geographic scales. Compared to land use variables, socioeconomic variables seem to have more direct effects on home-based trip making.

References

BADOE, D., A., MILLER, E., J. (2000), *Transportation-land-use interaction: empirical findings in North America, and their implications for modelling*, Transportation Research Part D, 5, 4, pp. 235–263.

BHAT, C., R., ELURU, N. (2009), *A Copula-based approach to accommodate residential self-selection effects in travel behavior modelling*, Transportation Research B, 43, 7, pp. 749–765.

BOARNET, M., G. (2011), *A Broader Context for Land Use and Travel Behavior, and a Research Agenda,* Journal of the American Planning Association, 77, 3, pp. 197-213.

BOARNET, M. G., AND CRANE, R. (2001), *Travel by design: The influence of urban form on travel,* Oxford University Press.

BOARNET, M., G., SARMIENTO, S. (1998), *Can land use policy really affect travel behaviour ?*, Urban Studies, 35, 7, pp. 1155–1169.

BROWNSTONE, D. (2008), *Key relationships between the built environment and VMT,* Draft paper prepared for the Transportation Research Board panel, "Relationships Among Development Patterns, Vehicle Miles Traveled and Energy."

BRUEGMANN, R. (June 18, 2007), *Brawl Over Sprawl*, Los Angeles Times. Retrieved April 9, 2012.

CALTHORPE, P. (1993), *The next American metropolis: Ecology, community, and the American dream,* Princeton Architectural Press.

CAO, X. (2010), *Exploring causal effects of neighborhood type on walking behavior using stratification on the propensity score*, Environment and Planning A, 42, 2, pp. 487–504.

CAO, X., MOKHTARIAN, P., L., HANDY, S., L. (2009), *Examining the impacts of residential self-selection on travel behaviour: A focus on empirical findings*, Transport Reviews, *29,* 3, pp. 359–395.

CAO, X., XU, Z., FAN, Y. (2009), *Exploring the connections among residential location, self-selection, and driving behavior: A case study of Raleigh, NC,* Paper presented at the 89th annual meeting of the Transportation Research Board.

CERVERO, R. (1986), *Suburban Gridlock,* New Brunswick, NJ Centre for Urban Policy Research Press.

CERVERO, R. (1989), *Jobs-housing balancing and regional mobility*, Journal of the American Planning Association, 55, 2, pp. 136-150.

CERVERO, R. (1996), *Mixed land-uses and commuting: Evidence from the American Housing Survey,* Transportation Research Part A, 30, 5, pp. 361-377.

CERVERO, R., DUNCAN, M. (2006), *Which Reduces Vehicle Travel More: Jobs-Housing Balance or Retail-Housing Mixing?*, Journal of the American Planning Association, 72, 4, pp. 475-490.

CERVERO, R., KOCKELMAN, K. (1996), *Travel demand and the three Ds: density, diversity, and design,* Working Paper No. 674, Institute of Urban and Regional Development, University of California, Berkeley.

CERVERO, R., KOCKELMAN, K. (1997), *Travel demand and the 3 Ds: Density, diversity and design*, Transportation Research Part D, 2 (3), pp. 199–219.

CHEN, X., SUEN, I.-S. (2010), *Richmond's Journey-To-Work Transit Trip-Making Analysis,* Management Research And Practice, 2, 3, pp. 234-248.

COX, W., UTT, J. (June 25, 2004), *The Costs of Sprawl Reconsidered: What the Data Really Show*, Heritage Foundation Backgrounder #1770, The Heritage Foundation.

CRANE, R. (2000), *The influence of urban form on travel: An interpretive Review*, Journal of Planning Literature, 15, 1, pp. 3–23.

CRANE, R., CREPEAU, R. (1998), *Does neighborhood design influence travel? A behavioral analysis of travel diary and GIS data*, Transportation Research Part D, 3, 4, pp. 225 –238.

D'SOUSA, E. et al. (2010), *Environment and Physical Activity GIS Protocols Manual,* in: (A. Forsyth, Ed.). Design for Health. Retrieved November 1, 2011 from: http:// www.designforhealth.net/resources/gis_protocols.html.

DUANY, A., PLATER-ZYBERK, E. (1991), *Towns and town-making Principles*, Rizzoli.

EWING, R., CERVERO, R. (2001), *Travel and the built environment: A Synthesis*, Transportation Research Record, 1780, pp. 87–114.

EWING, R., CERVERO, R. (2010), *Travel and the built environment: A meta-analysis*, Journal of the American Planning Association, 76, 3, pp. 265–294.

EWING, R., HALIYUR, P., PAGE, G., W. (1995), *Getting around a traditional city, a suburban planned unit development, and everything in between*, Transportation Research Record, 1466, pp. 53–62.

FRANK, L., PIVO, G. (1995), *Impacts of mixed use and density on utilization of three modes of travel: Single-occupant vehicle, transit, and walking*, Transportation Research Record, 1466, pp. 44–52.

FRIEDMAN, B., GORDON, S., P., PEERS, J., B. (1994), *Effect of neotraditional neighborhood design on travel characteristics*, Transportation Research Record, 1466, pp. 63-70.

GORDON, P., RICHARDSON, H., W. (2001), *The Geography of Transportation and Land Use*, In: Holcombe, R. G. and S.R. Staley (Eds.). Smarter Growth: Market-Based Strategies for Land-Use Planning in the 21st Century, Greenwood Press.

HANDY, S., L. (2005), *Smart growth and the transportation–land use connection: What does the research tell us?*, International Regional Science Review, 28, 2, pp. 146–167.

HANDY, S., L., CAO, X., MOKHTARIAN, P., L. (2005), *Correlation or causality between the built environment and travel behaviour ? Evidence from Northern California*, Transportation Research Part D, 10, 6, pp. 427–444.

HEATH, G., W., BROWNSON, R., C., KRUGER, J., MILES, R., POWELL, K., E., RAMSEY, L., T. (2006), *The effectiveness of urban design and land use and transport policies and practices to increase physical activity: A systematic review*, Journal of Physical Activity and Health, 3, 1, pp. S55–S76.

HENDERSON, K., A., BIALESCHKI, M., D. (2005), *Leisure and active lifestyles: Research reflections*, Leisure Sciences, 27, 5, pp. 355–365.

KELBAUGH, D., S. (Ed.) (1989), *The pedestrian pocket book: A new suburban design strategy,* Princeton Architectural Press.

KRIZEK, K., J. (2003), *Residential relocation and changes in urban travel – Does*

neighborhood-scale urban form matter?, Journal of The American Planning Association, 69, 3, pp. 265–281.

KUZMYAK, R., J., PRATT, R., H. (2003), *Land Use and Site Design: Traveler Response to Transport System Changes, Chapter 15,* Transit Cooperative Research Program Report 95, Transportation Research Board (www.trb.org). Retrieved June 2013 from: http://gulliver.trb.org/publications/tcrp/tcrp_rpt_95c15.pdf.

LITMAN, T., STEELE, R. (2012), *Land Use Impacts on Transport How Land Use Factors Affect Travel Behavior*. Retrieved June 7, 2013 from: http://www.vtpi.org/landtravel.pdf.

MCFADDEN, D. (2007), *The behavioral science of transportation,* Transport Policy, 14, 4, pp. 269-274.

MCNALLY, M., G., KULKARNI, A. (1997), *Assessment of the land-use-transportation system and travel behavior*, Transportation Research Record, 1607, pp. 105-115.

MODARRES, A. (1993), *Evaluating Employer-Based Transportation Demand Management Programs*, Transportation Research Record A, 27, 4, pp. 291-297.

MOKHTARIAN, P., L., CAO, X. (2008), *Examining the impacts of residential self-selection on travel behavior: A focus on methodologies*, Transportation Research B, 43, 3, pp. 204–228.

SALON, D. (2006), *Cars and the City: An Investigation of Transportation and Residential Location Choices in New York City,* Dissertation submitted in fulfillment of the Ph.D. in Agricultural and Resource Economics, University of California, Davis.

SARZYNSKI, A., WOLMAN, H., L., GALSTER, G., HANSON, R. (2006), *Testing the Conventional Wisdom about Land Use and Traffic Congestion: The More We Sprawl, the Less We Move?*, Urban Studies, 43, 3, pp. 601-626.

SPEARS, S., BOARNET, M., G., HANDY, S., L. (2010), *Draft policy brief on the impacts of land use mix based on a review of the empirical literature,* California Air Resources Board, Retrieved May 23, 2011, from http://arb.ca.gov/cc/sb375/policies/policies.htm.

STEAD, D. (2001), *Relationships between land use, socioeconomic factors, and travel patterns in Britain,* Environment & Planning B: Planning & Design, 28, 4, pp. 499-528.

THILL, J., C., KIM, M. (2005), *Trip making, induced travel demand, and accessibility*, Journal of Geographical Systems, 7, 2, pp. 229-248.

TRANSPORTATION RESEARCH BOARD (2011), *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*, National Cooperative Highway Research Program (NCHRP) Report 684.

ZHOU, B., KOCKELMAN, K. (2008), *Self-selection in home choice: Use of treatment effects in evaluating the relationship between the built environment and travel behaviour*, Transportation Research Record, 2077, pp. 54–61.

Initial submission: 1.04.2013
Revised submission: 9.06.2013
Final acceptance: 12.06.2013

Correspondence: Xueming Chen, Rm. 511, Scherer Hall, 923 West Franklin Street, Richmond, VA 23284-2028, P: (804) 828 -1254 / F: (804) 827 – 1275.

E-mail: xchen2@vcu.edu

Journal of Urban and Regional Analysis,
vol. V, 1, 2013, p. 45 - 64

THE DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN THE GREEK REGIONS

Marialena **PETRAKOU**
Credit Suisse, Luxembourg

Abstract: This study investigates the determinants of FDI in the Greek regions. The aim of the study is to understand whether and to what extent the presence of localization economies in the Greek regions, has an impact on FDI locational decisions. We use a pooled cross-section dataset of FDI stock and we study the effect of localization economies and of other basic determinants, on the attraction of FDI. We find the most significant influences to be market size, human capital, geographic position and the presence of localization economies.

Key Words: *foreign direct investment, regional differences, Greece.*

Introduction

Foreign Direct Investment (FDI) has become a fundamental aspect of the global economy since 1990s (UNCTAD 2003 in Bevan and Estrin 2004). Multinational Enterprises (MNEs) play an essential role in promoting economic growth by contributing to the transfer of new technologies and to the diffusion of new knowledge to the domestic economy (Kinoshita 2006). Several studies have shown that FDI can contribute positively to the economic growth of the recipient country by creating productivity gains, technology transfers, know-how diffusion in the domestic market and increasing managerial skills (Schoors and Tol 2002). The local economy can benefit from positive externalities related to FDI which relate to the capturing of technological and knowledge spillovers as well as adoption of efficient production methods and practices (Pike et al. 2006).

Moreover, FDI attraction can be increasingly important for the development of small economies, by allowing them to benefit from the external knowledge provided by the foreign firms, absorb new knowledge and finally catch up with the leading countries. The attraction of FDI in a rather small economy of the European South like Greece, can be a vital tool for enhancing economic development and increasing productivity. In addition the establishment of foreign subsidiaries in the subnational Greek market can be of greater importance due the fact that foreign firms pay attention to locational specificities when they decide where to locate. Hence, the attraction of FDI at the regional level can potentially boost the economic development of these areas and therefore, it can play an important role for the implementation of regional development policy.

In this study, we focus on analyzing the factors that affect FDI location in the Greek regions. Greece is currently examining the support of policies aiming to attract foreign investors in order to revitalize the economy and tackle the consequences of the financial crisis and thus it is vital

to analyze the parameters that contribute best to this process. There has already been some discussion about FDI inflows in the Greek market and particularly about the main dynamics which influence FDI location (Bitzenis et al. 2007, Pantelidis et al. 2008, Georgopoulos et al. 2006, Dimelis 2004). The previous studies conclude that the most decisive FDI motives are market growth, market size and human capital. In this paper we will also examine the effect of regional sectoral specialization on FDI locational strategies. The industrial concentration generates important agglomeration economies and spatial externalities arising from the sectoral specialization of the region. We will prove that foreign investors in Greece don't only prefer to reap the benefits of geographical proximity to urban centers but they also pay attention to industrial clustering and wish to benefit from this type of agglomeration economies. Therefore this shapes their locational decisions accordingly. Moreover the sectoral specialization of the Greek regions has not been analyzed as FDI determinant in previous studies so it is important to learn the potential impact of industrial specialization on FDI location patterns because it could be used as an effective policy measure in the future.

The next section is devoted in briefly revising the theoretical and empirical literature of the determinants of FDI. The third section describes the results from the data analysis and provides information for the regional and sectoral distribution of FDI. It also presents the results of the econometric model and provides the most significant FDI determinants. The last section provides conclusions and policy implications.

Literature Review and Empirical Studies

A brief review of the determinants of FDI location

Several studies have focused on outlining the MNEs' motives to internationalize their production capacities. Dunning (2000) refers to the Owneship-Localisation-Internalisation (OLI) triangle and argues that a firm internationalizes its production because of ownership, location and internalization advantages. Hence, the firm aims to keep its ownership advantages (property rights, patents or technology) rather than selling them to another firm. Moreover a firm prefers to internalize its activities in order to minimize the transaction costs associated with the market mechanism and avoid any uncertainties (Dunning 2000). Lastly the multinational company seeks for locational advantages which might be related to low labor costs, market size, natural resources or cultural specificities (Bevan and Estrin 2004).

According to Dunning's theory, the locational decisions of MNEs depend on the type of strategy they want to follow. Dunning (2002) states three main decisive factors that encourage MNEs to establish their affiliates in the domestic market. Firstly if the motives of the MNE are resource-seeking or if the company follows a supply-oriented approach, the locational decisions depend on factor endowments differences and they seek either to benefit from natural resources or from cheap labor. On the other hand a market-seeking investment or a market oriented strategy refers to the aim of serving a foreign market by locating within this market (Dunning and Lundan 2008). Hence, FDI are encouraged by the host country's market size and market growth (Dunning 2002). For example large regional market size and good infrastructure seem to play a decisive role on the foreign companies' locational decisions when they invest in China (Cheng and Kwan, 1999). Finally the last type of MNEs comprises the companies that adopt efficiency-seeking strategies and they aim to increase their competitiveness (Dunning 2002).

National or regional market size appears to be a significant FDI determinant in many empirical studies. For instance, Bevan and Estrin (2004) find that the size of the market and the level of market growth remain influential factors of FDI attraction in the Central and Eastern European

Countries (CEECs). Also Resmini (2008) indicates that a high development level, generally measured by GDP per capita, represents the most important motivation for MNEs to locate in CEECs. The above authors stress the influence of the host market's level of development on the FDI attraction and they argue that FDI prefer to locate in more developed regions.

Additionally Nunnenkamp (2002) refers to the significance of other host features for FDI attraction like low production costs and a high level of human capital. A cheap and educated labor force makes the transition economies of Europe an attractive place for foreign investment. Also Bevan and Estrin (2004) demonstrate that proximity to large/central markets (indicated by the relative distance between the home and host country) affect FDI location in the CEECs. Therefore it can be derived that apart from market size and market growth, gravity factors also determine the locational decisions of foreign investors in the Eastern European transition economies. The analysis of the FDI determinants will be analyzed thoroughly in the third section of this paper.

Empirical studies show that the MNEs that have penetrated the Greek market are mostly seeking for attractive national brand names or local supply chain networks (Georgopoulos and Preusse 2006). In other words the foreign firms that engage to direct investment in Greece aim mostly at serving the domestic market. Pantelidis and Nikolopoulos (2008) show that the multinational enterprises that invest in the country are mostly driven by market size and consumer demand which allows us to derive that the Greek economy attracts mostly market-seeking FDI. Furthermore Barrios et al. (2002) find that in comparison with other EMU countries like Ireland and Spain, Greece attracts mainly FDI in traditional and low technology sectors. In the subsequent analysis of our data, this issue will be examined thoroughly.

As confirmed by the theoretical and empirical literature, the domestic characteristics that are related to market size, market growth, human capital and geographic position have a significant impact on FDI attraction. Nevertheless, it is undisputable that in some cases MNEs tend to follow patterns of spatial concentration and hence to cluster in places with locational specificities. Therefore it is important to acknowledge the forces of agglomeration when we discuss MNEs locational strategies.

Localization economies as an FDI determinant

Ottaviano and Puga (1998) argue that firms tend to cluster together and agglomerate spatially. This is attributed to the fact that increasing returns to scale and pecuniary externalities arising from technological spillovers, supply-demand linkages and labor pooling, induce firms to concentrate geographically. In other words forces of agglomeration can influence the firms' locational decisions. Furthermore Ottaviano and Thisse (2004) stress the importance of imperfect competition and economies of scale in explaining the agglomeration of firms in metropolitan areas. The continuous concentration of FDI in urban centers and cities reveals the potential benefits that accrue from the occurrence of urbanization economies. These economies are external to the firms and arise from urban services and from the density of activities that concentrate in metropolitan centers. (Frenken et al. 2007).

Despite the increasing importance of urbanization economies, in this study we examine the impact of localization economies on the FDI locational strategies. Localization economies occur in spatial agglomerations of firms operating in related or similar activities (Cantwell and Iammarino 2001) and the term was initially conceived by Marshall in 1890 (Malmberg 2001). The concentration of firms in the same industry allows the emergence of positive externalities arising from a specialized pool of labour, from lower prices for inputs and outputs and from the

potential occurrence of knowledge spillovers. The benefits are external to the firm but internal to the industry. Historically they were mostly evident in the manufacturing sector and particularly in the textiles industry (Parr 2002).

Consequently the participation in an industrial clustering offers companies the opportunity to have access to information, knowledge and technology (Porter 1998). Hence, this clustering is mainly attributed to the fact that foreign firms can benefit from technology and knowledge spillovers arising from co-location with previously established industrial units operating in the same sector (Campos and Kinoshita 2003). Therefore this kind of industrial clustering induces foreign firms to enter this market because of the potential advantages they can enjoy due to localized skilled workforce or spillovers from cooperation (Parr 2002).

The spatial concentration of activities operating in the same industry promotes the emergence of national and regional specialization patterns. In other words localization economies contribute to the formation of the sectoral characteristics of the region and depend upon the previous local presence of industry related activities (Cantwell and Iammarino 2001). According to the empirical study of Guimaraes et al. (2000) the locational decisions of FDI in Portugal were strongly determined by the existence of this kind of agglomeration economies. The authors observe the concentration of FDI activity to places where the manufacturing and services sectors appear to have a strong share in employment compared to the national average.

In addition, further evidence about the influence of localization economies on FDI strategies, is found in Resmini (2000) where she examines the determinants of MNEs' location in the CEECs from a sectoral perspective. The author finds that the industrial specialization of those countries and the emergence of agglomeration economies (localization and urbanization economies), accordingly shape the geographical and sectoral patterns of FDI location.

Therefore according to the theoretical and empirical literature, the regional and sectoral specialization of the host economy can generate positive localization externalities which subsequently can act as determinant of foreign direct investment. In the next sections we will explore the potential emergence of such kind of external economies in the Greek regions and we will test the hypothesis of a rather positive or negative influence on FDI location in the Greek market. Thus, the research questions that we will pose in this study are the following: first of all we will test whether the sectoral specialization of each subnational unit of analysis has a significant impact on the geographical distribution of FDI. With regard to that we will test the hypothesis which predicts that the regions which achieve high sectoral specialization and localisation economies, manage to attract more FDI. Furthermore we will examine the same hypothesis for other potential determinants of FDI like market size, human capital and level of development.

So far we presented a brief review of the literature regarding the types of FDI strategies and the determinants of FDI. Before we investigate the impact of these dynamics on FDI location in the Greek regions, it is important to examine the geographical and sectoral evidence of MNEs' presence in the Greek economy and analyse the economic structures of the Greek regions that are the hosts of FDI.

Geographical and Sectoral Distribution of FDI

This section is focused on explaining the sectoral and geographical distribution of FDI as well as the sectoral specialization of the home countries and host regions. Table 2 indicates that a

substantial share of foreign direct investment has occurred in the sectors of financial services and manufacturing. In particular we observe a concentration of almost 30% of foreign activity to financial services. The substantial attractiveness of FDI in the banking sector is possibly attributed to the fact that financial companies are sufficiently internationalized and seek to serve foreign markets via direct investments and to expand their activities. In addition the deregulation patterns of the financial industry determined substantially its expansion into foreign markets and subsequently into the Greek market (Athanassopoulos and Labroukos 1999). According to our analysis the foreign subsidiaries that specialize in financial services originate mostly from Luxembourg, Netherlands, Cyprus, France and the United Arab Emirates (Table 1).

The two metropolitan areas of the country, namely Attiki (Athens and the peripheral area) and Thessaloniki, attract 30 and 48 percent of the total foreign financial activities respectively. Moreover 11% of FDI established in Dodekanisos seem to specialise in the financial sector (Table 2). The pronounced concentration of FDI in banking services in the two main urban centres of the country shows the possible influence of urbanization economies and economies of scale on the location decisions of MNEs.

Furthermore Table 2 points out the concentration of activities in the manufacturing sector (34%). In the analysis, we divided the manufacturing sector into 3 classifications: consumer, intermediate and capital industries (Jackson and Petrakos, 2001 in Petrakos et al. 2008). The consumer and intermediate industrial groups have the largest share in the entire sector (19% and 13% respectively), although we observe moderate attraction in the high tech activities. In other words the foreign subsidiaries that enter the Greek market focus mostly on traditional sectors like manufacturing (consumer and intermediate industrial activities) and also on the banking sector. Additionally we observe an important percentage of investment in wholesale trade (13%).

Furthermore, noteworthy is the fact that while the inward investment in the financial sector originates from European and non European countries in an equal basis, in the manufacturing sector non European countries outnumber. In particular the United States is sixth in ranking with regard to the overall investment but 85% of this investment focuses on manufacturing. Finally 15% of all inward investment is directed to transport and communications sector and the main investor countries are Germany and Italy. This uneven distribution of foreign affiliates among sectors indicates that industrial and hence international specialization is an important determinant of FDI. Previously we made the assumption that the large concentration of FDI in the financial sector is attributed to the demand-oriented strategy of the foreign firms and hence to the requirement for large market size and consumer demand.

Geographical patterns reveal a high investment concentration from the host country perspective as well. According to the research analysis, 88% of the foreign investment is directed to Athens and the peripheral regions (Attiki), 8% in Thessaloniki, the second largest prefecture, and the rest of investment is geographically scattered to the rest of Greece (Table 3). In other words Attiki receives the bulk of foreign investment in terms both of number and total value. This implies the formation of a core-periphery FDI pattern. The remarkably high geographical concentration in Attiki allows us to assume that FDI is driven mostly from a large market size and from market growth, regarding the facts that almost 1/3 of the population is gathered in the prefecture of Attiki (Hellenic Statistical Authority 2010) and that it constitutes the most prosperous prefecture (Petrakos et al. 2008). Also we make the assumption that MNEs tend to agglomerate in Attiki in order to benefit from urbanisation economies that arise from the dense co-location of different activities such as industries, universities or trade unions that

Table 1

FDI inward stock in the EU-27

EU COUNTRIES	FDI per capita	FDI share
1 France	15.53	15.41
2 UK	16.12	15.28
3 Germany	8.53	10.89
4 Netherlands	39.20	10.02
5 Spain	13.93	9.87
6 Belgium	48.84	8.07
7 Italy	5.74	5.34
8 Sweden	27.50	3.94
9 Ireland	39.18	2.70
10 Poland	4.23	2.51
11 Denmark	27.39	2.34
12 Austria	16.71	2.17
13 Czech Republic	10.97	1.78
14 Portugal	9.40	1.55
15 Finland	16.54	1.37
16 Luxembourg	177.82	1.33
17 Romania	3.34	1.12
18 Hungary	6.34	0.99
19 Bulgaria	6.04	0.72
20 Slovakia	8.50	0.71
21 Greece	**3.27**	**0.57**
22 Cyprus	26.41	0.32
23 Estonia	11.91	0.25
24 Slovenia	7.81	0.25
25 Lithuania	3.83	0.20
26 Latvia	5.05	0.18
27 Malta	22.19	0.14
Total		**100.00**

Source: UNCTAD, 2008

generate positive externalities to foreign firms (Frenken et al. 2007).

The majority of the investment that Attiki receives is focused on the financial and manufacturing sector. Almost 60% of the foreign capital invested in the region is specialized in these sectors, which implies that apart from the geographical concentration, a similar pattern for industrial concentration is being observed (Table 2). In other words the banking sector is highly concentrated in the core region of Attiki and in the region of Thessaloniki. It is interesting to notice that although the financial foreign activities are strongly clustered in the two metropolitan centres of Attiki and Thessaloniki, the manufacturing and other activities demonstrate a rather significant dispersion across the country. For example manufacturing investment is strongly evident in peripheral prefectures as in Magnesia or Kilkis (Fig.1). A possible interpretation of this result is the fact that some of the prefectures that attract foreign firms which specialise in a particular sector, are located in close proximity with urban centres. For instance the prefecture of Kilkis is

Table 2

Sectoral distribution of FDI stock in Greece by NACE 1 classification, 2008.

NACE 1 DIGIT	SECTOR	FDI (%)
J	Financial services	30.20
D1	Manufacturing (consumer)	19.01
I	Transport, storage and communications	14.61
D2	Manufacturing (intermediate)	13.69
G	Wholesale and retail trade	12.94
K	Real estate, renting and business activities	2.13
H	Hotels and restaurants	2.11
F	Construction	1.94
O	Other community, social and personal service	1.07
D3	Manufacturing (capital)	0.78
E	Electricity, gas and water supply	0.58
N	Health and social work	0.58
C	Mining and quarrying	0.12
A,B	Agriculture, forestry and fishing	0.02
M	Education	0.00
	Total	100.00

Source: Bank of Greece 2010.

close to the metropolitan area of Thessaloniki. From a different perspective, 100% of investment in Hotels and Restaurants is concentrated in the prefecture of Dodekanisos (a complex of Aegean islands). Obviously this concentration is attributed to the foreign affiliates' operation in touristic business.

Despite the high concentration of foreign affiliates in Attiki and despite the high attraction of both manufacturing and banking sector, the foreign activities are rather diversified sectorally. For instance 16% of the foreign affiliates established in Attiki operate in the sector of transport and communication and 12% in wholesale and retail trade. On other hand in the peripheral prefectures we notice an evident sectoral specialisation pattern. For instance 11 out of 25 regions examined, attract foreign affiliates that operate only in manufacturing and 4 out of 25, attract firms that operate only in Hotels and Restaurants (Fig.1). Hence, foreign direct investment in Greek regions follows a pattern of high sectoral specialization.

In the next section it will be examined if the sectoral specialization of the foreign subsidiaries is correlated with the sectoral specialization of the subnational units of analysis and if yes, what kind of correlation it is observed. In addition we will test the impact of some more "traditional" variables such as regional income, regional market size, human capital and geographical position on the investment strategies of MNEs.

Tabel 3

Independent variables and Definitions

Symbol	Independent variable	Definition
GDP/CAP	Development level	Regional Development level
POPPOT	Population Potential	Market size and Accessibility
GRAV	Gravity index	Regional Accessibility
HC	Human capital	Share of population with Tertiary Education
RCAEMPL	Specialisation index in terms of employment	Localisation economies
UNITS/AREA	Specialisation index in terms of clustering firms	Localisation economies

Data and Methodology

The econometric model

This study aims to determine the motives for inward FDI in 25 Greek prefectures for the year 2008 (employing stock data from 2004). It is going to be examined whether the location decisions of foreign firms are being positively affected by the sectoral specialization of each region as well as by other traditional determinants like market size, regional accessibility, regional level of development and human capital. To test these hypotheses we have analyzed a cross-section dataset for foreign FDI in ten NACE 1 digit sectors. The analysis is carried out via quantitative methods and in particular via regression analysis. The option of regression analysis is related to the attempt to measure the direction and the significance of the impact of the host regions' locational characteristics on FDI attractiveness. The dependent variable is FDI per capita stocks measured in Euros, for each region for each sector for the year 2008. This provides a total of 510 observations given the fact that in the regression analysis we incorporated variables that were constructed by data employed from all the 51 NUTS III regions (prefectures) of Greece. The explanatory variables are the host regions' features which determine mainly the attractiveness of the Greek prefectures for foreign direct investment. More specifically we include variables to capture the effects of the development level, regional market size, geographic position, human capital and regional specialization.

First and foremost most of the theoretical literature identifies GDP per capita (GDP/CAP) as the appropriate proxy to measure the *development level* of a region. GDP per capita reflects both demand and supply in a region. On the demand side it shows the local potential demand and on the supply side it reflects the region's absorptive capacity of FDI (Resmini 2008). We are going to examine the hypothesis that FDI is mostly attracted by relatively developed regions. Therefore the coefficient of GDP/CAP is expected to be positive and significant.

Moreover a significant strand of empirical literature identifies *regional market size* as an important FDI determinant in the sense that the larger the market size the greater the foreign investment inflows. (Campos et al. 2003, Braunerhjelm et al. 1996, Janicki et al. 2004 and Petrochilos 1989). Resmini (2000) states that the larger the domestic market the more prospects it offers to foreign investors. The FDI attractiveness for a region is being enhanced when the foreign investors aim to benefit from increased regional demand and supply

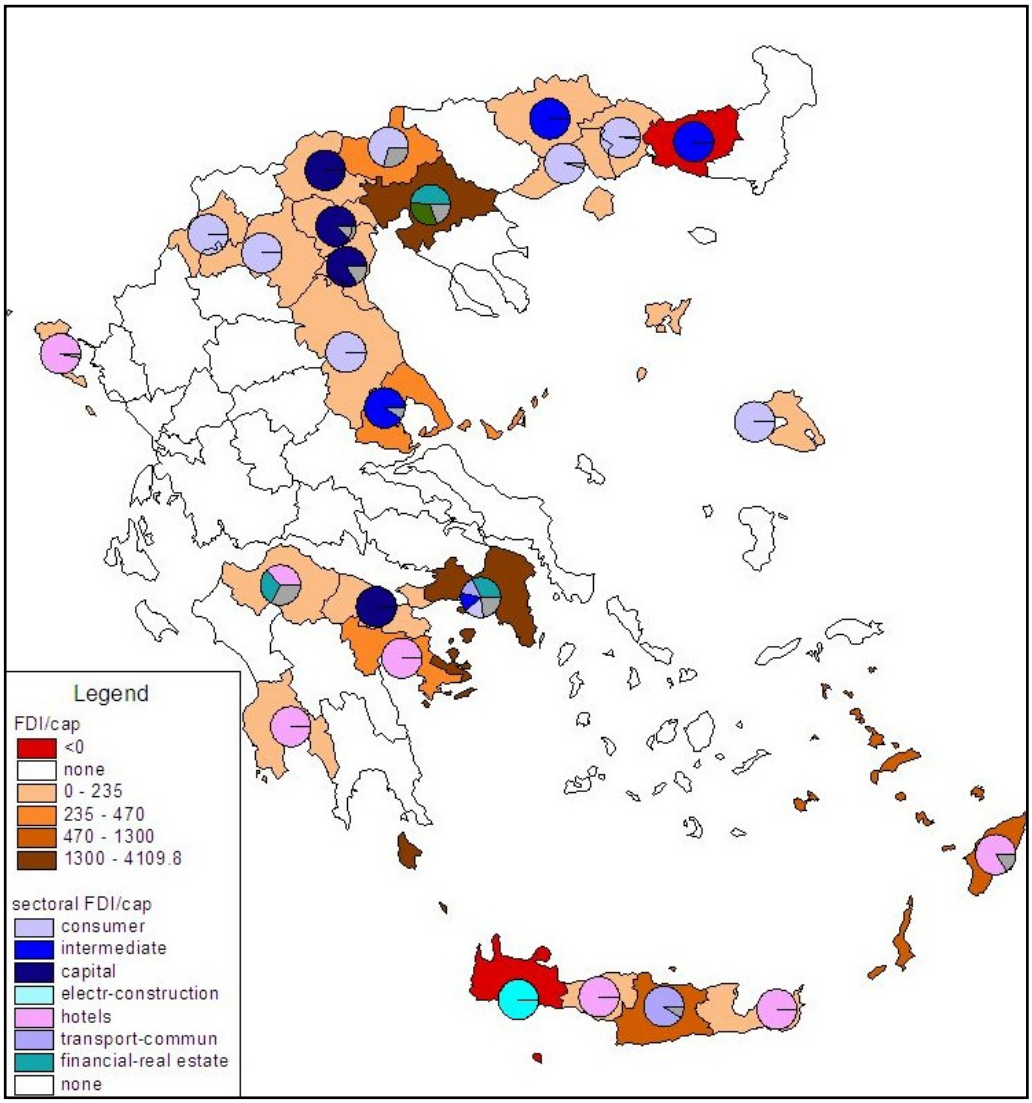


Fig.1 - **FDI/capita in total and by sector in the Greek regions (NUTS 3 level), 2008**
The prefectures drawn in red colour indicate that the particular regions have experienced divestment policies which in 2008 seemed to be cumulatively more intensified compared to inward investment policies.

(Braunerhjelm et al, 1996). The locational decisions of multinational enterprises in the transition economies of Central and Eastern Europe are driven in a great extent by market size (Campos et al. 2003). However, despite the significant impact of regional market size especially in labour intensive sectors (manufacturing), many argue that the importance of this determinant starts to decline in favour of other factors such as agglomeration economies (Cho 2004).

In this study the variable we employ as proxy for regional market size is the Population Potential index (POPPOT) and is defined as:

$$Zi = \sum_{j=1}^{N-1} (P_i * P_j / d_{ij}^k)$$

where *Pi* is the population of this region, *Pj* is the population of all the other NUTS III regions, *dij* is the distance between this region and all the other regions and *k* is an exponent that takes the values *k*=1 or *k*=1.2. This index is a measure of the regional market size (approximated by population) and of the relative accessibility of the centre of this region to the other regions. In other words this variable is being used as a proxy for the region's market size and of its strategic position in comparison to the other regions (Petrakos 1996). It depicts market access as an increasing function of market size measured by regional population and a decreasing function of trade costs, proxied by the distance between regions and it takes values greater than 0 (Petrakos et al. 2011). We expect the coefficient of the variable to be positive and significant.

Regional accessibility is also measured by the Gravity index (GRAV). We use the Gravity index (GRAV) as a geographical indicator in order to estimate the geographical position of each NUTS III Greek region regarding the location of all other regions in the country, on a pan-European scale. In particular the gravity index indicates whether a region has a central or peripheral position in a given geographic economic space (Petrakos, 2003). We use this index in order to show whether a Greek region's central or peripheral position in the national economic space, has a positive or negative influence on FDI locational decisions. The formula for this index is:

$$G_i = \Sigma \frac{P_j}{d_{ij}} + P_i$$

where P is the population of regions *i* and *j* and *d* is the air-travel distance between them. It indicates the sum of distances among the centroids of each pair of regions weighed by their populations (Topaloglou et al. 2005). If the index has high value it means that the region possesses a more central place in the Greek territory and thus has greater accessibility than more peripheral regions, and if it has low value, it possesses a more peripheral position (Petrakos, 2003). The expected sign of the coefficient of this variable is expected to be positive and significant.

Furthermore the theoretical and empirical literature supports the influence of *human capital* on the location decisions of foreign firms (Noorbakhsh et al. 2001, Doring et al. 2006, McCann 2008, Fine 2000, Cho 2004, Agiomirgianakis et al. 2003). Hanson (1996) in Noorbakhsh et al. (2001), claims that human capital can have a significant impact on the geographical distribution of foreign activity in the host country. Multinational enterprises, especially if they specialize in high tech production, seek for locations endowed with a skilled workforce. This is attributed to the fact that human capital can improve the quality of labour because it reflects work experience and education and hence it enhances a region's productivity (Agiomirgianakis et al. 2003 and Fine 2000). Therefore foreign firms tend to cluster in urban areas where they can take advantage of the pool of skilled people essentially with tertiary education level (McCann 2008). The availability of a skilled labor force attracts foreign firms because they can benefit from knowledge spillovers which can subsequently improve regional growth (Doring et al, 2006). We measure the level of human capital accumulated in a region by the level of tertiary education of the workforce. Noorbakhsh et al. (2001) define tertiary education as "*the number of accumulated years of secondary and tertiary education in the working age of the*

population" (pp. 1597). The expected sign of the coefficient is positive and significant.

Moreover a large part of the academic literature recognizes the significance of agglomeration economies as a motivation for foreign investors to establish their affiliate plants in a region. Many authors (Campos et al. 2003, Braunerhjelm et al. 1996, Filippaios et al. 2004, Agiomirgianakis et al. 2003, Frenken et al. 2007, Iammarino et al. 2006, Cantwell et al. 2001, Porter 1998) support that foreign firms choose to locate in places where they can benefit from the presence of already existing firms operating in the same sector as the foreign affiliates. The industrial specialisation of the host region (indicated by a large production industry in a particular sector), appears strong motivation for MNEs. In other words the presence of localisation economies (spatial clustering of previously sectorally related activities) allows the foreign firm to benefit from external economies of scale and from potential knowledge spillovers and hence increases the FDI attractiveness (Iammarino and Cantwell 2001, Frenken et al. 2007). In other words we make the assumption that the location decisions of FDI are affected by the sectoral specialisation of each prefecture and therefore they tend to concentrate in already specialised regions where they can benefit from a concentrated employment ratio in one industry or from other firms in the same industry clustered together.

The variables that we have employed in order to estimate the impact of localisation economies on the FDI attractiveness are:

1. A Revealed Comparative Advantage Index (RCAEMPL), which is a sectoral indicator and represents the degree of sectoral specialisation of each region in terms of employment. This index was primarily used in order to show how strong exporting performance a country or region has and hence to test the possibility of comparative advantage. In this study the formula we used in order to construct this variable is: RCAEMPL = (Xir/Xr) / (Xi/X) where i is the industrial sector, r the region and X is employment (Petrakos et al. 2008). If RCA>1 it means that the region specializes in one sector more than the national average. We calculated the RCAEMPL for 51 regions and for 10 sectors (Table 4). We expect RCAEMPL to have a positive and significant impact on FDI. Therefore we expect the coefficient of RCAEMPL to be positive and significant.

2. A spatial clustering indicator (UNITS/AREA) which demonstrates the number of pre-existing firms operating in each sector in each region. We constructed this variable in order to capture the effect of agglomeration economies/localisation economies (firms benefit from economies that arise when they are co-located with one or more firms in the same sector). The coefficient is expected to be positive and significant.

On the basis of the literature and on our analysis we estimated the following model explaining FDI location in the Greek regions:

$$1\ )\ FDI_{ij} = a + b_1 RCAEMPL_{ij} + b_2 HC_{ij} + b_3 POPPOT_{ij} + b_4 GDP/CAP_{ij} + e_{ij}\ ,$$

where FDIij represents the FDI per capita stock in 51 regions and in 10 sectors, where i = regions and j = sectors. Our hypothesis for the first explanatory variable is Ho=0: b1=0 or H1: b1>0 because we expect RCAEMPL to have a positive and significant impact on FDI. We assume the same for the rest of the coefficients (b2, b3, b4).

We run the model 1 three times using alternative variables to capture accessibility and localisation economies.

2) $FDI_{ij} = a + b_1 GRAV_{ij} + b_2 HC_{ij} + b_3 RCAEMPL_{ij} + b_4 GDP/CAP_{ij} + e_{ij}$ and

3) $FDI_{ij} = a + b_1 GRAV_{ij} + b_2 HC_{ij} + b_3 UNITS/AREA_{ij} + b_4 GDP/CAP_{ij} + e_{ij}$

The database for this study was provided by the Bank of Greece (Statistics Department) and includes data for inward FDI stock invested in 25 Greek prefectures from the year 2004 to the year 2008. In other words we summed the time series of FDI inflows data during the period 2004-2008 and we run our model using FDI stock data. The geographic unit used in the analysis is regions at NUTS (Nomenclature of Territorial Units for Statistics) 3 level. In this paper we use information for the sectoral specialization of the regions we examine and we account for all sectors at NACE 1 digit (United Nations 2010).

Our sample consists of 583 observations of foreign direct investments from 51 foreign countries in 25 NUTS 3 Greek regions. The data we employed come from the database constructed by the International Investment Division of the Statistics Department of the Bank of Greece and include the stock of foreign capital invested in Greece for the period 2004- 2008. Our sample consists of 51 investor countries from which 21 are EU members. We used data for 25 regions (out of the 51 Greek regions of the sample, 25 showed FDI attraction data) that attract FDI in 10 sectors. However the initial database contained data including the value of investment in 25 regions in 40 NACE 2 digit sectors. In order to be able to run our model (using the pool method) we modified the primary database and we controlled for 10 NACE 1 digit

Table 4

Determinants of FDI in Greece: the econometric model

Model	(1)	(2)	(3)
C	-23.754**	-107.105**	-96.601**
	(-4.28)	(-14.19)	(-12.82)
RCAEMPL	8.768**	6.736*	
	(3.73)	(1.95)	
GDPCAP	0.0006	0.001*	0.001*
	(1.56)	(2.49)	(2.39)
HC	0.183*	0.9999**	0.885**
	(1.87)	(6.37)	(5.65)
POPPOT	0.1772**		
	(30.3)		
GRAV		0.359**	0.356**
		(10.93)	(10.84)
UNITS/AREA			2.199**
			(4.40)
R^2 ADJ	0,80	0,53	0,56
N	510	510	510
Fstat	518,74	144,52	151,18

Notes: The dependent variable is the locational choice of FDI. Columns (1) (2) and (3) contain the coefficients of the independent variables and their level of significance. The parentheses contain the *t*- statistics.
* Significance at the 10% level
** Significance at the 1% level

sectors. This modification helped us construct our dependent variable (FDI per capita) which will be used in the model.

The empirical results

The database we used in order to construct our dependent variable contained both regional and sectoral data. As mentioned above we obtained data regarding the foreign investment value for 25 NUTS 3 regions and in 10 NACE 1 digit sectors. Nevertheless, when we constructed our explanatory variables we accounted for 51 regions (total number of Greek prefectures) and for 10 sectors. Therefore the regression analysis is comprised by cross-sectional data or in other words "*data describing each of different units at a single point in time*" (Dielman 1983, pp. 112). Furthermore due to the fact that we estimate our model for regions and sectors at the same time, we used pooled cross-section data in the analysis. But instead of accounting for each number of regions across a sequence of time periods (Dielman 1983) we accounted for each number of 51 regions across a sequence of 10 sectors. Therefore we estimated our model using E-Views (version 6.0) and the Generalised Least Squares (GLS) method correcting for Heteroscedasticity. Our sample contains 510 observations (51 NUTS 3 regions and 10 NACE 1 digit sectors).

Table 4 presents the estimation results concerning the determinants of FDI attraction in the Greek prefectures. In order to check for robustness of our results and estimate more precisely the relative importance of each hypothesis, we deploy alternative specifications. The model with the highest explanatory power and the one on which we base our hypotheses is depicted in column (1) in Table 4.

In the first model we test for some standard variables related to market conditions like market size, GDP per capita and human capital but also for some non traditional variables related to industrial factors like the sectoral specialisation of each region in terms of employment (RCAEMPL) or in other words for localisation economies. Furthermore we included the Population Potential Index (POPPOT). Therefore we seek to assess the role of the development level, the regional market size and its accessibility, the availability of human capital and of localisation economies as FDI determinants.

It is clearly obvious that investors are being strongly motivated by the existence of a high share of locally specialised workforce, with the relevant coefficient being positive and significant at 1% level. This finding indicates that foreign affiliates are mostly interested in locating in places where they can benefit from external economies arising from a high percentage of employment in their broad sector of activity. In other words they are interested in investing in locations where the relative size of the sector is large. Therefore we assume that they seek to benefit from the increased labour productivity that is caused by this specialisation (Frenken et al. 2007). This result corresponds to the one obtained by Resmini (2000) who investigated the effect of the size of the manufacturing sector of the CEECs in attracting European investments. Nevertheless the author found this impact significant only in the traditional sectors. Furthermore, Guimaraes et al. (2000) find similar evidence about the locational decisions of FDI in Portugal. In particular they discover that the most important motivation for foreign direct investment in Portugal is the achievement of agglomeration economies and especially localisation economies.

The positive and significant value of the RCAEMPL coefficient points out that foreign investors establish their affiliates in the Greek prefectures which obtain a high level of industrial specialisation in the same sector with the foreign enterprise. For instance the prefecture of

Magnesia has a high RCA ratio (1.97) in the manufacturing sector indicating a high specialisation relative to the national average, and 100% of the FDI are in the manufacturing sector (Table 2). The econometric model supports this correlation (significant at 1% level) and therefore the regional sectoral specialisation is found to be an important FDI determinant for the Greek prefectures.

In contrast to previous studies (Resmini 2000, 2008), in the first model the variable of GDP per capita doesn't appear significant, although the probability is slightly above the 0.1 level (p=0.1189). Therefore in this model the income level of the Greek prefectures doesn't appear to have as a strong effect on the locational decisions of fdi compared to the rest of the variables.

The third variable of the Model (1) is a proxy for human capital. The human capital variable has a positive and significant effect (in the 10% level of statistical significance) on FDI attraction. Therefore the hypothesis we made above regarding the strong influence of human capital on FDI locational decisions, is being confirmed by the analysis. This result coincides with the findings of Noorbakhsh et al. (2001) and Agiomirgianakis et al (2003) who acknowledge the fact that an economy with a highly educated and skilled workforce can be more productive and more appealing to investors. Above all if the foreign affiliate operates in the high tech manufacturing sector (capital-intensive industry), the pool of skilled labor gains importance for the FDI attraction (Agiomirgianakis et al. 2003). However, as Table 2 shows, the Greek regions managed to attract a small amount of FDI in the high tech manufacturing sector (0,78%) in the year 2008. For example the prefecture of Attiki (Athens and the suburbs) has a high percentage of human capital and a high specialisation ratio in high tech manufacturing activities (Table 4). Further investigation could possibly help us draw a correlation between the RCA in manufacturing (consumer) activities, the human capital endowments and the degree of attractiveness in this sector for each region. But this is not within the aim of this study to discover.

Finally the variable we included in the first model in order to test both the effect of market size and of accessibility on FDI location, has a positive and significant value in 1% level of significance (p=0.0000). The positive and significant value of POPPOT reflects the fact that foreign investors prefer large markets with high accessibility.

Therefore foreign investors are responding to a high demand of the host region. As a result foreign investors are motivated by traditional factors or "*classical sources of comparative advantage*" implying the market-seeking nature of FDI in Greece (Campos and Kinoshita 2003, pp. 9). Our result is in line with the research outcome of the above authors when they examined the determinants of FDI in European transition economies and they conclude that a large size of the domestic market drives foreign capital. Consequently FDI in the Greek regions as well as in the transition economies of Europe, is determined in a high degree by the potential to serve a large domestic consumer market.

Furthermore the positive and significant value of POPPOT indicates that MNEs choose to locate their subsidiaries in regions with easy access to metropolitan centres. For instance the relative high attraction of FDI in the prefecture of Kilkis can be partially attributed to the fact that it has geographical proximity to the region of Thessaloniki which is the second largest recipient prefecture of FDI (Table 3). This result corresponds to the one found by Campos and Kinoshita (2003) regarding the fact that the European transition economies that were in closer proximity with the Western European countries, had bigger possibility of attracting FDI.

According to our results presented in the first model, FDI in the Greek regions is determined mainly by a significant degree of local sectoral specialisation, a high level of human capital, a large regional market size and a high level of accessibility. The regional level of growth and development doesn't appear to have a robust effect on FDI location decisions in this model.

The second model has lower explanatory power than the first one. This is clear by the fact that R^2 adj is 0.53 which means that the explanatory variables account for 53% of the variation of the dependent variable. In the second model we incorporated the same variables as in the first model apart from the POPPOT index which we replaced with the gravity index (GRAV). As mentioned above the gravity index is a proxy for accessibility and centrality.

In this specification the coefficients of human capital and gravity obtain high significant value (at 1% level). The gravity factor continues to have a strong effect on FDI attraction and hence constitutes a robust FDI determinant. Nevertheless the statistical significance of the coefficient of RCAEMPL, which is the proxy that we used for occurrence of localisation economies, is being reduced to the 10% level which means that there is a 10% possibility that FDI are not motivated by the sectoral specialisation of each region. However RCA still proves to be an important determinant for FDI location. Finally Table 4 shows that the significance of the coefficient of GDP per capita (GDP/CAP) increases to the 10% level in comparison with the first model where it was not significant. Therefore in the second model the level of regional development is considered a good motivation for foreign investors to locate in the Greek prefectures.

These results are consistent with the findings of Bevan and Estrin (2004) who conclude that the main determinants of foreign investment in the economies of Eastern Europe are basically the development level and gravity factors. In other words, GDP per capita and proximity to the countries of Western Europe determines their level of attractiveness. By the same token and in line with the second specification of analysis, FDI in the Greek regions are strongly determined by gravity factors and by the development level.

The third econometric model (3) provides some interesting results as well. Instead of the RCA indicator we included the variable UNITS/AREA which we used as a proxy for localisation economies and particularly as a measure of the establishment of clustering firms in a region. The initial hypothesis was that firms that operate in a particular sector and agglomerate in a geographical space, constitute a strong determinant for FDI location due to the benefits that arise from co-location and agglomeration. The high significant value of the coefficient of UNITS/ AREA ($p = 0.0000$) provides strong support to this hypothesis. Therefore foreign firms choose to locate in places where they can benefit from the presence of other similar production units and from externalities arising from knowledge spillovers or specialised labour. It can be assumed that when foreign firms know that other companies have invested in the area earlier, they consider it safer and thus are more encouraged to engage in foreign investment. According to Campos and Kinoshita (2003) this can be explained by the fact that foreign investors can benefit from technology spillovers or from serendipitous contacts with former investors. This finding is in line with the research results of Cantwell and Iammarino (2001) where it is being argued that locational decisions of multinational enterprises are determined by the occurrence of localisation economies and hence by preceding firms operating in the same industry.

Therefore the last alternative specification reveals the following patterns of FDI attraction: A strategic position of the region in the domestic geo-economic space is considered a basic FDI determinant because it facilitates market accessibility. In addition, a high level of educated

workforce and a high level of regional development encourage foreign firms for investing in the Greek regional market. Finally the accomplishment of localisation economies in the region constitutes a motive for FDI.

The three models provide similar findings and therefore our results can be considered to be robust. Despite differences in the levels of significance of particular variables and the overall explanatory power they provide, all three models support the idea that specialization/ concentration, geography, human capital and development level are important drivers of FDI location at the regional level.

Conclusion

In this study we initially explored the sectoral and geographical distribution of foreign affiliates in the Greek regions and we observed a concentration activity in the region of the capital city (Athens) and the suburbs (Attiki prefecture). Furthermore, apart from the high geographical concentration of FDI and evident agglomeration in metropolitan centres, we also analysed the prominent sectoral specialisation patterns of the foreign affiliates as well as the high industrial concentration of FDI in prefectures other than the two metropolitan centres.

This uneven distribution of FDI leads us to explore the basic factors that exert influence on the MNEs' locational decisions and to test a number of hypotheses about the determinants of FDI location in the Greek regions. Following the theoretical and empirical literature, we accounted first for traditional FDI determinants like market size, development level, human capital and geographic position of the regions under examination. In addition we tested for the hypothesis that foreign affiliates *ceteris paribus* prefer to locate in places that appear to be specialised in the same industrial sector with them and thus we accounted for the regions' sectoral specialisation.

The empirical analysis revealed the following patterns: FDI locational strategies in the Greek regions are determined significantly by market size, in the sense that they choose to locate in regions with larger consumer demand and larger population. Furthermore the analysis showed that the locational strategies of MNEs depend upon the geographical position of each region, in the sense that they prefer to locate in central areas or in areas having relative proximity to large urban centres. Hence, access to metropolitan areas proves to be an important location determinant for FDI. In addition the development level of the host regions was found to be an important determinant of FDI location in two out of the three models that we presented. Although evidence is not as robust as in the case of the other variables, it is still likely that, *ceteris paribus,* FDI will tend to locate more often to advanced regions compared to less advanced ones. Moreover human capital appeared in a robust way to be a significant determinant of FDI location at the regional level and leads us to the conclude that MNEs consider a high regional educational level as an important factor determining their location decisions.

Finally the analysis provided us with evidence to claim that MNEs are strongly motivated by the existence of localisation economies in the region where they decide to locate. The positive influence of an industrial clustering of existing firms which operate in related sectors and a pool of specialised labour, allows us to argue that foreign capital is increasingly interested in locations that exhibit specialisation in similar sectors. In other words foreign companies want to benefit from spatial externalities arising from the sectoral specialization of the region because they can potentially create backward/forward linkages with the existing domestic firms and increase their profitability. This has significant advantages for the host economy as well since

the local workforce can increase its productivity and benefit from knowledge spillovers. Therefore it is safe to conclude that industrial clustering and sectoral specialization can become an important regional development policy tool for attracting FDI.

Overall, our empirical findings provide evidence that FDI attraction to the Greek regions is determined by gravity factors related to market size and geographic position, by the quality of regional human capital and by the occurrence of localisation economies. Hence, these results allow us to draw some policy implications about the methods of strengthening these effects at the subnational level and thus encourage the attraction of FDI.

First of all state interventions could improve regional accessibility and remove distance-related barriers by investing in infrastructure and in the development of adequate regional transport network. In addition policies aiming to improve the quality of human capital of the less attractive regions should be designed and implemented because apart from the positive effect it exerts on FDI attraction, it also enhances the absorptive capacity of the area. A highly skilled labour force can potentially understand better the practices and technologies followed by the foreign firms and hence spread new knowledge to the region. Consequently, encouraging the building of learning capacity can potentially enhance the FDI attractiveness.

Finally the encouragement of regional specialisation, through the formation of regional clusters of related activities may turn out to be a decisive strategy for the Greek regions. The positive externalities and knowledge spillovers that arise from the co-location of sectorally similar activities may improve the attractiveness of the region to FDI. Thus the encouragement of this kind of industrial clustering combined with initiatives promoting the development of linkages and communication among the local firms, can make the emergence of localisation economies more sustainable and hence more appealing to the foreign investors. Additionally the concentrated pool of specialised and skilled labour and the subsequent knowledge spillovers, might allow for the emergence of innovations or new activities which might lure more foreign enterprises in the future.

References

AGIOMIRGIANAKIS, G., ASTERIOU, D., PAPATHOMA, K. (2003), *The Determinants of Foreign Direct Investment: A Panel Data Study for the OECD Countries,* City University Economics Discussion Papers 03/06, Department of Economics, City University, London.

ATHANASSOPOULOS, A.,D, LABROUKOS, N.,S. (1999), *Corporate Customer Behaviour towards financial services: empirical results from the emerging market of Greece,* International Journal of Bank Marketing, 17, 6, pp. 274-285.

BARRIOS, S., DIMELIS, S., LOURI, H., STROBL, E. (2002), *Efficiency spillovers from foreign direct investment in the EU periphery: A comparative study of Greece, Ireland, and Spain,* Review of World Economics, 140, 4, pp. 688-705.

BEVAN, A.,A., ESTRIN, S. (2004), *The determinants of foreign direct investment into European transition economies*, Journal of Comparative Economics, 32, pp. 775-787.

BITZENIS, A., TSITOURAS, A., VLACHOS, V. (2007), *Motives for FDI in a small EMU member state: the case of Greece*, Journal of Economics and Business, 2, pp. 11-42.

BRAUNERHJELM, P., SVENSSON, R. (1996), *Host country characteristics and agglomeration in foreign direct investment,* Applied Economics, 28, pp. 833-840.

CAMPOS, N., F., KINOSHITA, Y. (2003), *Why does FDI goes where it goes? New evidence from the transition economies*, IMF Working Papers WP/03/228.

CANTWELL, J., IAMMARINO, S. (2001*), EU Regions and Multinational Corporations: Change, stability and Strengthening of Technological Advantages*, Industrial and Corporate

Change, 10, 4, pp. 1007-1037.

CHENG, L., K., KWAN, Y., K. (2000), *What are the determinants of the location of foreign direct investment? The Chinese experience,* Journal of international economics, 51, 2, pp. 379-400.

CHO, J.,W. (2004), *Foreign Direct Investment: Determinants, trends in flows and promotion policies* in Investment Promotion and Enterprise Development Bulletin for Asia and the Pacific, United Nations, Economic and Social Commission for Asia and the Pacific.

DIELMAN, T.,E. (1983), *Pooled Cross-Sectional and Time Series Data: A Survey of Current Statistical Methodology,* The American Statistician, 37, 2, pp. 111-122.

DIMELIS, S., P. (2004), *Prospects for the Greek economy in the post-enlargement era,* The World Economy, 27, 6, pp. 803-827.

DORING, T., SCHNELLENBACH, J. (2006*), What do we know about geographical knowledge spillovers and regional growth? : A survey of the literature*, Regional Studies, 40, 3, pp. 375-395.

DUNNING, J., H. (2000), *Regions, globalization and the knowledge-based economy,* in UNCTAD, Transnational Corporations, 10, 3.

DUNNING, J., H. (2003), *Determinants of Foreign Direct Investment: Globalization-Induced Changes and the Role of Policies,* in Tungodden, B., Stern, N., Kolstad, I., (eds.), Toward Pro-Poor Policies - Aid, Institutions and Globalization, Annual World Bank Conference on Development Economics Europe.

DUNNING, J., H., LUNDAN, S., M. (2008), *Multinational enterprises and the global economy*, Edward Elgar Publishing.

FILIPPAIOS, F., KOTTARIDI, C. (2004*), Investment patterns and the competitiveness of Greek regions,* Review of Urban and regional Development Studies, 16, 2, pp. 93-112.

FINE, B. (2000), *Critical Survey. Endogenous growth theory: a critical assessment*, Cambridge Journal of Economics, 24, pp. 245-265.

FRENKEN, K., OORT F.,V., VERBURG, T. (2007), *Related Variety, Unrelated Variety and Regional economic Growth,* Regional Studies, 41, 5, pp. 685-697.

GEORGOPOULOS, A., PREUSSE, H.,G. (2006), *European Integration and the dynamic process of investments and divestments of foreign TNCs in Greece*, European Business Review, 18, 1, pp. 50-59.

GUIMARAES, P., FIGUEIREDO, O., WOODWARD, D. (2000), *Agglomeration and the Location of Foreign Direct Investment in Portugal,* Journal of Urban Economics, 47, pp. 115-135.

HELLENIC STATISTICAL AUTHORITY (2010), http://www.statistics.gr/portal/page/portal/ESYE [Accessible online 15 July 2010].

IAMMARINO, S., MCCANN, P. (2006), *The structure and evolution of industrial clusters: Transactions, technology and knowledge spillovers*, Research Policy, 35, pp. 1018-1036.

JANICKI, H.,P., WUNNAVA, P.,V. (2004), *Determinants of foreign direct investment: empirical evidence from EU accession candidates,* Applied Economics, 36, pp. 505-509.

KINOSHITA, Y., LU, C., H. (2006), *On the role of absorptive capacity: FDI matters to growth*.

MALMBERG, A., MASKELL, P. (2001), *The elusive concept of localization economies-towards a knowledge-based theory of spatial clustering*, AAG Annual Conference on 'Industrial Clusters' Revisited: Innovative Places or Uncharted Spaces?, New York, 27 February – 3 March 2001.

MCCANN, P. (2008), *Globalisation and Economic Geography: the world is curved not flat*, Cambridge Journal of Regions, Economy and Society, 1, pp. 351-370.

NOORBAKHSH, F., PALONI, A. (2001), *Human capital and FDI inflows to developing countries: new empirical evidence,* World Development, 29, 9, pp. 1593-1610.

NUNNENKAMP, P. (2002), *Determinants of FDI in developing countries: has globalization changed the rules of the game?,* Institute of World Economics Kiel, Working Paper, 1122.

OTTAVIANO, G., I., P., PUGA, D. (1998), *Agglomeration in the global economy: A survey of the 'new economic geography',* The World Economy, pp. 1-33.

OTTAVIANO, G., THISSE, J.,F. (2004), *Agglomeration and Economic Geography,* Handbook of Regional and Urban Economics, 4, pp. 2563-2608.

PANTELIDIS, P., NIKOLOPOULOS, E. (2008), *FDI attractiveness in Greece,* International Advances in Economic Research, 14, 1, pp. 90-100.

PARR, J.,B. (2002), *Agglomeration economies: ambiguities and confusions,* Environment and Planning A, 34, pp. 717-731.

PETRAKOS, G., KALLIORAS, D., ANAGNOSTOU, A. (2011), *Regional convergence and growth in Europe: understanding patterns and determinants,* European Urban and Regional Studies, 18, 4, pp. 375-391.

PETRAKOS, G. (2003), *Peripheral European Transitions: Performance, Structure and Trade relations in the Balkan Region*, South Eastern Europe Journal of Economics, 1, pp. 41-64.

PETRAKOS, G., C. (1996), *The Regional Dimension of Transition in Central and East European Countries: An Assessment,* Eastern European Economics, 34, 5, pp. 5-38.

PETROCHILOS, G.,A. (1989), *Foreign Direct Investment and the Development Process*, Avebury .

PIKE, A., RODRÍGUEZ-POSE, A., TOMANEY, J. (2006), *Local and regional development,* Taylor & Francis.

PORTER, M. (1998), *Clusters and the new economics of competition,* Harvard Business Review, pp. 1-18.

RESMINI, L. (2008), *The location of multinational enterprises in Central and Eastern European countries,* in Krieger-Boden, Morgenroth and Petrakos, The Impact of European Integration on Regional Structural Change and Cohesion, Routledge.

RESMINI, L. (2000), *The determinants of foreign direct investment in the CEECs, new evidence from sectoral patterns*, Economics of transition, 8, 3, pp. 665-689.

SCHOORS, K., VAN DER TOL, B. (2002), *Foreign direct investment spillovers within and between sectors: Evidence from Hungarian data,* Working Papers of Faculty of Economics and Business Administration, Ghent University, Belgium, 2002/157.

TOPALOGLOU, L., KALLIORAS, D., MANETOS, P., PETRAKOS, G. (2005), *A Border Regions Typology in the Enlarged European Union,* Journal of Borderlands Studies, 20, 2, pp. 1-24.

UNITED NATIONS (2010), *United Nations Statistical Division*.[online] Available at http:// unstats.un.org/unsd/cr/registry/regcst.asp?Cl=2 [Accessed 3 July 2010].

BANK OF GREECE (2010), *Unpublished data for FDI in Greece, International Investment Section,* Statistics Department.

Initial submission: .17.09.2012
Last revised submission: 16.05.2013
Final acceptance: 31.05.2013

Correspondence: Credit Suisse, 56 Grand Rue L-2010, Luxembourg.

E-mail: petrakou29@gmail.com

Journal of Urban and Regional Analysis,
vol. V, 1, 2013, p.65 - 76

‘NORTH OF THE SOUTH’ OR ‘SOUTH OF THE NORTH’? REVISITING THE SPATIALLY-COMPLEX ECONOMIC DIVIDE IN ITALY

Luca **SALVATI**
University of Rome 'La Sapienza', Rome, Italy

Abstract: The present study evaluates the economic dynamics of more than 600 local districts in two contrasting periods (mid-1990s and mid-2000s) of the recent development path of Italy in the light of territorial disparities between northern and southern regions. In order to produce a multidimensional concept of ‘economic development’ 16 variables (including share of agriculture and industry on total product, labour productivity by sector, per-capita and per-worker value added) have been considered together by using exploratory multidimensional statistics. This approach has been preferred to more traditional procedures centred on single-variable analyses (e.g. GDP level and its changes over time) or convergence analysis since it allowed us to debate on the increasingly complex geography of the economic development observed in Italy and the 'newly emerging' socioeconomic disparities among regions. Results indicate that the traditional north-south gap has not been significantly reduced along the last ten years. Coastal-inland and urban-rural gradients revealed as crucial especially in southern Italy, indicating the late transition from agriculture and state-driven industry towards services producing low value added. The persistence of the north-south divide allowed us to identify ‘changing’ and ‘structurally stable’ variables as a possible target for integrated developmental policies.

Key Words: *economic development, local district, exploratory data analysis, North-South divide, geographical gradient, Italy.*

Introduction

Formation and persistence of territorial disparities among countries or region is one of the most striking issues for economic, social, and geographical analysis. Impressive changes in the economic structure of countries have occurred all over the world after World War II determining an amplification of the disparities observed among regions within the same country. The shift from modernity to late modernity occurred over the recent years coincided with the shift from industry-oriented to service-oriented economies. The recent crisis is shaping the spatial distribution of wealth and poverty by re-drawing economic geographies in both developed and developing regions and discriminating among rich (and economically-resilient) and poor (and economically-weak) societies.

In some way, this issue can be theoretically reconnected with the convergence problem (i.e. a country growing faster than others). Economic theory has long been aware of this problem and various explanations have been provided in the past (Barro and Sala-i-Martin, 2004 for a review). A certain school of thought reached an optimistic view of reality by predicting that a set of countries (or regions) will tend to assume a common level of output per capita in the presence of constant returns to scale and decreasing productivity of capital. However, empirical studies show contrasting, less optimistic, results. As a matter of fact, it was clearly

demonstrated how processes of economic convergence produced only a partial reduction of territorial disparities even in developed regions (Arbia and Paelinck 2003).

In Europe, regional convergence studies have experienced an acceleration of interest in the last decades due to the issues raised by the unification process. Since large differentials in per capita GDP across regions are regarded as an impediment to economic and monetary union, the narrowing of regional disparities is indeed regarded as a fundamental objective for the European Union policy. One example is southern Europe, where important social and economic disparities exist among neighbouring regions. Although several Mediterranean countries experienced an impressive development in the last decades, regional disparities exist especially where rural areas yet show a level of per capita GDP considerably lower than the European average. As an example, marginal rural areas in Portugal, Spain, Italy, and Greece exhibit critical conditions due to the limited chances to a rapid growth, claiming for renewed policy interventions (Brunori and Rossi 2007). Population growth, agricultural intensification and industrial development have been regarded as the key factors consolidating the gap between affluent and dynamic regions and economically-disadvantaged areas (Giusti and Grassini 2007).

In Italy, however, the reduction in the North-South divide was amazing, due to the drastic growth of southern Italy economy, fostered by the public policy programmes launched by southern Italy Development Fund, a special agency for the industrialization of the southern region (see Viesti et al. 2011 for an historical excursus). Unfortunately, the Fund did not succeed in creating the conditions for a self-sustained growth of the regional economy and when the Fund's extraordinary intervention finished, the process of convergence ended, too (Terrasi 1999).

The same can be said for the most recent years where different, sometimes mirroring phenomena like exurban development around the main cities, land abandonment in marginal areas, and tourism concentration along the coastal rim have been observed. While the geography of Italy was therefore changed as far as income level and population density is concerned, this process did not significantly altered the shape and amplitude of territorial disparities that characterized the country in the past following north-south, coast-inland, and urban-rural gradients.

The present study contributes to the analysis of persisting socioeconomic disparities in Italy with policy implications for other socially-divided and economically-polarized countries in the Mediterranean basin and outside the European community. A geographical approach based on multidimensional analysis and carried out at a detailed spatial scale may shed further light in this problematic issue. As a matter of fact, the choice of scale (as instances, administrative regions, provinces or finer ones, like the local districts used in this study) may play a non-trivial role in defining the real extent of convergence processes (Dunford 2002).

The economic dynamics of the Italian local districts have been explored in two contrasting periods (mid-1990s and mid-2000s) of the recent development path of Italy. The former period was characterized by a moderate increase in gross domestic product, high unemployment rate, moderate to high inflation rate, and financial volatility, while the latter period, after Italian accession to the Euro monetary system, featured a lower increase in gross domestic product coupled with declining unemployment rate, low inflation rate and financial stability.

The novelty of this study is to consider economic development as a multidimensional concept - not exclusively centred on GDP level and changes - that can be described by several variables

dealing with the economic structure and productive specialization of local districts, the characteristics of the local labour markets, and the spatial distribution of value added, among others. This approach provides further insight in the geography of economic development by highlighting the relationship among the variables mostly contributing to the 'newly emerging' regional disparities in Italy.

In order to produce a multidimensional concept of 'economic development', 16 variables (including share of agriculture and industry on the total production, labour productivity by sector, per-capita and per-worker value added) have been considered together in a multivariate framework. 'Latent' indicators of economic development in Italy have been proposed and analyzed in their spatial distribution over time as a potentially useful and original approach to the analysis of territorial disparities (Casadio Tarabusi and Palazzi 2004). In this perspective, Italy represents an intriguing case study as it shows a pronounced north-south divide: northern Italy is a developed region with a dynamic industrial and service-oriented economy, while southern Italy is still a disadvantaged region oriented to traditional tertiary productions (e.g. constructions, commerce, public administration) and medium- or low-income agriculture. Results of this study may thus overcome the restricted number of papers devoted to this problem in developed and internally-divided countries. By providing effective indicators to monitoring the evolving socioeconomic disparities at country scale, the present paper also discusses the role of selected geographical gradients in conditioning the economic development in polarized countries.

Methods

The investigated area

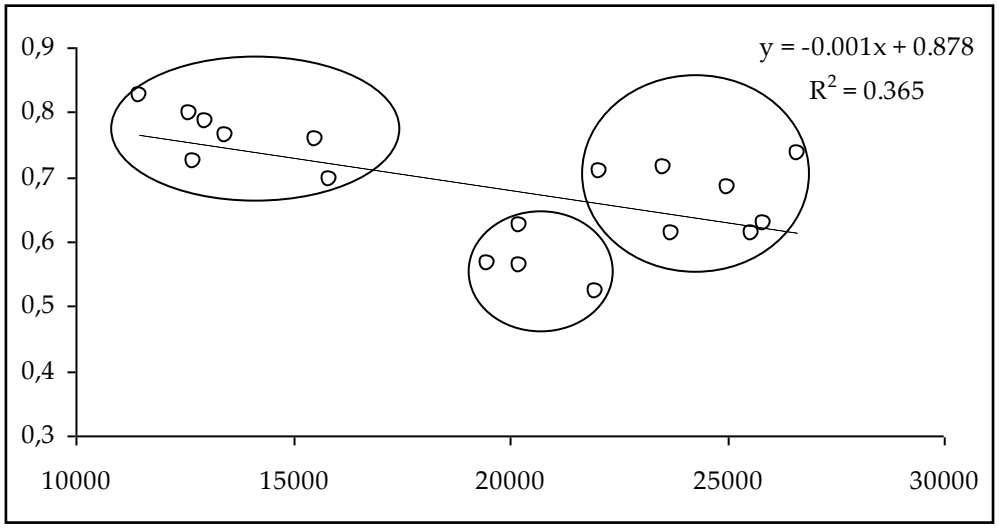
The examined area covers the whole of Italy (301,330 km^2). Our observation units are Local Labour Market Area (LLMA) districts, which reflect homogeneous areas from the economic perspective at a detailed geographical scale. A total of 784 and 686 districts were defined by the Italian National Statistical Institute (ISTAT) according to data collected respectively in 1991 and 2001 National Censuses of Population (ISTAT 2006).

Socioeconomic indicators

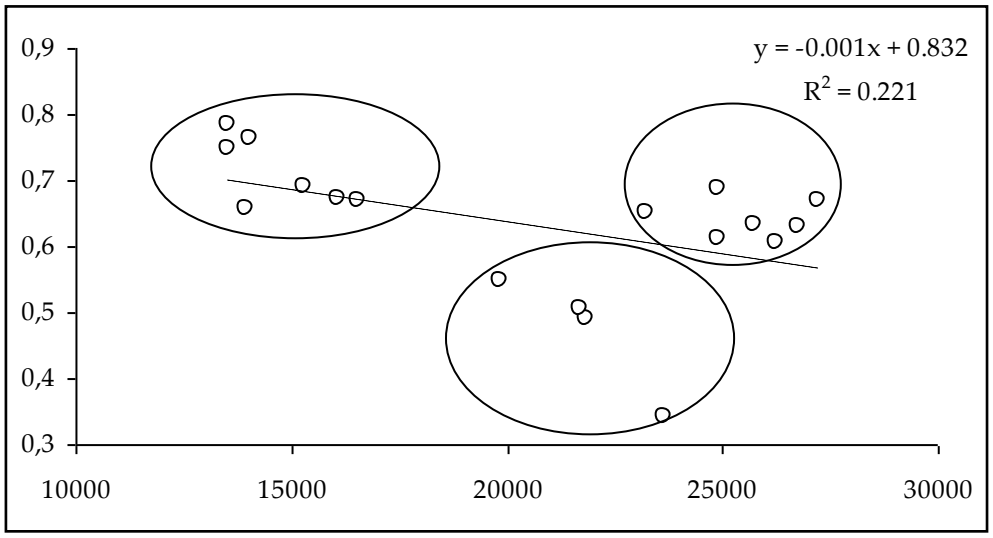
The indicators used in the present study (Table 1) have been made available at the district scale from data provided by ISTAT and referring to 1996 and 2005. The following variables have been calculated: *per-head* and *per-worker* district value added, share of agriculture and industry in total district product, labour productivity by sector (agriculture, industry, and services), manufacture-specialized districts (dummy), industrial clusters (dummy), and un-specialized districts (dummy). Supplementary variables describing district specialization in tourism, average elevation as a *proxy* of accessibility, population density, the prevalent land-use (urban *vs* rural) and the geographical position of each district (northern and central Italy *vs* southern Italy) have been also considered (ISTAT 2006).

Statistical analysis

To explore the pair-wise relationship among the selected indicators at the local scale, non-parametric Spearman rank cograduation tests have been developed in both 1996 and 2005 for two geographical divisions separately (northern-central Italy and southern Italy) testing for significance at $p < 0.001$ based on Bonferroni's correction for multiple comparisons. A Factor Analysis (FA) was carried out to assess the evolving regional disparities in Italy and to identify



(a) 1996



(b) 2005

Fig. 1 - **The relationship observed between average regional per-head value added (x-axis) and an index of territorial disparities (y-axis) (see 'methods' for details) by year (from left to right, circles highlight the position of southern, central and northern Italy regions).**

the geo-economic gradients underlying local development. FA was applied to a matrix composed of nine standardized variables (all variables marked with one star in Table 1) made available on 784 and 686 districts, respectively in 1996 and 2005. As the analysis was based on the correlation matrix, the number of significant axes (*m*) was chosen by retaining factors

Table 1

The indicators calculated in this study

Acronym	Variable	Source
INC	Per-head district value added*	National and Territorial Accounting Statistics (ISTAT)
VPR	Labour productivity in the economy*	
ASH	Share of agriculture in total product*	
APR	Labour productivity in agriculture*	
ISH	Share of industry in total product*	
IPR	Labour productivity of industry*	
SPR	Labour productivity of services*	
MAN	Manufacture-specialized district**,***	National Accounts and Population Census (ISTAT)
CLU	District belonging to an industrial cluster**,***	
DES	Unspecialized district**,***	
SSH	Share of services in total product**	
TUR	Tourism-specialized district**,***	
URB	Urban district**,***	
PDE	Population density (inhabitants/km^2)**	Population-Households Census (ISTAT)
GEO	Geographic position (0: northern and central Italy; 1: southern Italy)**,***	
ELE	Elevation (0: lowland and upland area; 1: mountainous area)**	

* indicates active variables in Factor Analysis;
** indicates supplementary variables used in non-parametric correlation analysis - see text for details;
*** indicates a dummy variable.

with eigenvalue > 1 (Salvati and Zitti 2009). The Keiser-Meyer-Olkin (KMO) measure of sampling adequacy, which tests whether the partial correlations among variables are small, and Bartlett's test of sphericity, which tests whether the correlation matrix is an identity matrix, have been used in order to assess the quality of FA outputs. These tests indicate if the factor model is appropriate to analyse the original data. Based on the scores of the two most important factors, local districts were segregated into different groups (Salvati and Zitti 2009). The coordinates of each district over the *x*-*y* factorial plane (Factor 1 *vs* Factor 2) were correlated by Spearman Rank Cograduation Tests to the supplementary variables (see Table 1) measured at the district scale.

Finally, disparities in the spatial distribution of district value added in 1996 and 2005 have been evaluated in the 20 Italian administrative regions by computing a territorial disparity ratio as the ratio of *per-head* value added range (max – min) to the average *per-head* value added at the district scale. The relationship between *per-head* regional value added and the index of territorial disparities in district value added was assessed using Pearson correlation coefficients in 1996 and 2005 testing for significance at $p < 0.001$.

Results

Non-parametric correlation statistics (Tables 2-3) and the PCA results (Tables 4-5) illustrated the recent changes observed in the Italian economy at the district scale. In 1996 the different performances of the agriculture, industry, and service sectors reflected primarily the economic

Table 2

Spearman rank cograduation coefficient matrix among the selected indicators observed in 1996 by geographical division in Italy

Variable	ASH	ISH	APR	IPR	SPR	VPR	INC
Northern and central Italy							
PDE	**-0.45**	0.16	**0.28**	0.14	**0.28**	**0.33**	**0.39**
ASH		-0.04	0.13	**-0.27**	-0.03	**-0.34**	**-0.44**
ISH			0.16	**0.25**	**0.26**	0.10	0.10
APR				0.07	0.11	**0.30**	0.14
IPR					0.19	**0.75**	**0.55**
SPR						**0.55**	**0.29**
VPR							**0.59**
Southern Italy							
PDE	**-0.51**	0.01	-0.01	0.09	-0.02	**0.25**	**0.24**
ASH		-0.19	0.12	**-0.40**	-0.04	**-0.57**	**-0.59**
ISH			0.04	**0.44**	**-0.28**	0.01	0.13
APR				0.12	0.12	**0.44**	**0.27**
IPR					0.10	**0.59**	**0.50**
SPR						**0.53**	**0.25**
VPR							**0.72**

(bold indicates significant correlations with $p < 0.001$ [n = 784]).

gap between northern and southern Italy. During 1996-2005, a slow transition from manufacture industry to high-value added tertiary productions (including tourism) in northern and central Italy and an even slower transition from agriculture to medium-intensity services in southern Italy emerged from the analysis. In southern districts, where the share of agriculture was higher, the depressing effect on local income deepened, as measured by the Spearman's test. This could be ascribed to the worsening performance of the primary sector in this region compared with the rest of the country, mainly due to scale and learning effects (Esposti 2011).

In both years, however, the FA highlighted the importance of north-south gradient in Italy. Coastal-inland and urban-rural gradients result also important especially in 2005. Factor 1 explained 58% and 50% of the total variance respectively in 1996 and 2005 and represents the specialisation of each district in the industrial sector being also positively correlated to per-head value added. Factor 2, which accounted for 13% of the total variance in both 1996 and 2005 represents the specialisation of each district in the tertiary sector in opposition to the productivity of the industrial sector.

The two factors can be thus considered respectively as a 'wealth' axis and a gradient representing the transition from industry to service at the local scale. The former axis was positively associated to population density and urban districts suggesting that, in both years, affluent districts were mainly located in lowland areas with high concentration of industrial settlements and 'intensive' agriculture (high APR loading). However, the importance of the industrial clusters declined rapidly from 1996 to 2005. The latter axis was correlated to population density and to the share of services in total district product. The growing role of urban systems, coastal-inland gradient and tourism district specialization along this axis likely

Table 3

Spearman rank cograduation coefficient matrix among selected indicators observed in 2005 by geographic division in Italy

Variable	ASH	ISH	APR	IPR	SPR	VPR	PIL
Northern and central Italy							
PDE	**-0.51**	0.07	0.05	**0.27**	**0.48**	**0.47**	**0.45**
ASH		0.00	**0.29**	-0.19	**-0.36**	**-0.37**	**-0.46**
ISH			0.04	**0.29**	-0.17	-0.09	0.01
APR				0.19	0.01	**0.22**	0.07
IPR					**0.31**	**0.65**	**0.49**
SPR						**0.84**	**0.66**
VPR							**0.72**
Southern Italy							
PDE	**-0.49**	-0.05	-0.05	0.16	**0.32**	**0.34**	**0.28**
ASH		-0.07	**0.23**	**-0.39**	**-0.58**	**-0.63**	**-0.72**
ISH			0.03	**0.32**	**-0.23**	-0.12	0.02
APR				0.01	0.03	**0.23**	0.01
IPR					**0.40**	**0.56**	**0.59**
SPR						**0.92**	**0.75**
VPR							**0.82**

(bold indicates significant correlations with $p < 0.001$ [n = 686])

indicates a 'relinking' process between district income and suburbanisation dynamics especially across the major city-regions (Milan, Turin, Venice).

Using per-head district value added, Table 5 reports an evaluation of the economic disparities in Italy between 1996 and 2005. The polarized economic geography of Italy observed in 1996 changed only partially in 2005, with a weak reduction of the regional disparities observed in southern and insular Italy. North-eastern Italy was the most balanced region in terms of value added spatial distribution in both examined years, likely due to the polycentric territorial organization observed in this area. Moreover, the negative relationship between the index of regional disparities and the average level of value added at the regional scale was significant in both years (Figure 1). Interestingly, in 1996 southern Italian regions are less homogeneous than northern and central Italy and the reverse pattern was observed in 2005.

Discussion

The present study provides insights in the analysis of local development in a divided country by exploring the economic performances of the Italian local districts in two contrasting periods (mid-1990s and mid-2000s) of the recent development path. By considering a high-resolution spatial unit of analysis and key socioeconomic indicators in a diachronic multidimensional approach, the paper introduces a novel approach in the study of local development with emphasis on regional disparities. Despite some criticisms concerning the relevance of the LLMA district as an homogeneous economic region, this spatial unit shows appreciable features that fill the need for data integration, reliability and relevance to regional issues (Salvati et al. 2012).

Table 4

Results of Factor Analysis by year

Variable	1996			2005	
	Axis 1	Axis 2		Axis 1	Axis 2
# districts	784			686	
Explained variance[1]	57.5	13.3 (70.8)		49.6	12.8(62.4)
KMO index[2]	0.590			0.604	
Bartlett index[3]	$3774^{**}_{(21)}$			$3877^{**}_{(21)}$	
Goodness-of-fit χ^2	$498^{**}_{(8)}$			$433^{**}_{(8)}$	
Factor loadings (active variables)					
INC	0.791	0.272		0.811	0.244
VPR	0.933	0.258		0.927	0.375
ASH	-0.543	-0.178		-0.569	-0.260
APR	0.524	0.384		0.272	0.192
ISH	0.502	-0.121		0.367	-0.359
IPR	0.932	-0.360		0.924	-0.380
SPR	0.580	0.527		0.754	0.563
Correlation with supplementary variables[4]					
MAN	0.086	0.194**		0.192**	0.016
CLU	0.226**	0.250**		0.160*	0.026
DES	-0.373**	-0.144*		-0.543**	-0.085
SSH	-0.190**	-0.189**		0.039	0.537**
TUR	0.026	0.045		-0.008	0.125*
URB	0.211**	-0.072		0.312**	0.107*
PDE	0.190**	0.194**		0.264**	0.270**
GEO	-0.660**	-0.374**		-0.640**	-0.071
ELE	-0.029	-0.086		-0.117*	-0.125*

1) Percent values (cumulated variance in brackets).
2) Keiser-Meyer-Olkin (KMO) measure of sampling adequacy.
3) Bartlett's test of sphericity (degrees of freedom in brackets).
4) Spearman rank cograduation test (significance was indicated by stars: * $0.001 < p < 0.01$; ** $p < 0.001$).

Results highlight the increasingly complex economic geography of Italy reflected in the changing relationships among the considered indicators (Salvati and Zitti 2007). While

processes of convergence have been widely observed between regions located in the three geographical divisions of North-West, North-East and Centre (Terrasi 1999, Proietti 2005, Dunford 2008), contrasting evidence has been provided on actual convergence processes in southern Italy (Arbia and Paelinck 2003, Patacchini 2008, D'Uva and De Siano 2011). Our data indicate that the north-south gap was impressive in 1996 and was not significantly reduced in the most recent years. This claims for a 'turning back' to the economic geography of regional disparities in highly polarized countries. As a matter of fact, a renewed understanding of the north-south problem in Italy (and likely in the whole southern Europe as well) should reveal its wide-range impacts and causes, extending well beyond the industry-service spatial dichotomy which revealed the variables most immediately affected (Esposti 2011). The north-south divide involves processes, related not only to economic but also to organisational, institutional and

Table 5

Disparities in *per-head* district value added (euros) in Italy by year and geographical division

Geographical division	Max	Min	Average	Range (max-min)	Ratio of Range to Average	% Average/ Max
1996						
North-west	28,295	7,411	16,389	20,884	1.27	73.8
North-east	31,039	9,605	17,439	21,434	1.23	69.1
Centre	24,971	6,162	14,012	18,809	1.34	75.3
South	22,872	3,392	8,044	19,480	2.42	85.2
Main islands	20,473	3,668	8,240	16,805	2.04	82.1
2005						
North-west	37,473	10,544	21,106	26,929	1.28	71.9
North-east	36,771	12,576	22,536	24,195	1.07	65.8
Centre	31,179	9,730	18,807	21,449	1.14	68.8
South	22,105	4,758	11,333	17,347	1.53	78.5
Main islands	21,514	5,088	11,416	16,426	1.44	76.4

social factors, which develops at the regional scale. Some reflections can be therefore formulated from the geographical and the economic perspective (Dunford 2002).

Results suggest that the divide between northern and southern Italy, according to the contrasting development paths that have characterised the two regions from the 1970s, consolidated during the investigated period. It was claimed how the economic weakness of southern Italy was depending on to the chronicle 'development deficit' which is commonly observed in other Mediterranean areas (King et al. 2001). However, the causes why southern Italy remains one of the most disadvantaged regions in the European Union are extremely complex as they depend on path-dependent socio-economic factors that are difficult to reverse (e.g. low education attainment and, more in general, a poor quality of the human capital, high unemployment rate, a perennial 'brain drain' towards the 'north' and the spread of organized crime).

Industrialisation started in the early -1960s mainly due to public policies impacting few and limited areas, with financial incentives for large plants in the chemical, petrochemical and steel industries, all sectors that have been deeply affected by the following restructuring processes observed in the 1980s (Dunford and Greco 2007). Up to now the share of industry in total production have declined, except for some geographically-isolated areas (e.g. some districts located in Basilicata region which are commonly referred as 'the north of the south') in favour of low - and medium-profitability service activities, including commerce, constructions, and the public sector.

However, together with the north-south axis, this paper underlines the importance of other crucial gradients in the analysis of the spatial distribution of district value added. The FA identified at least two additional axes, the coastal-inland and the urban-rural gradients, as associated to the level of economic development. In this view, the Spearman correlation analysis demonstrated how the (spatial) linkages between economic processes such as agricultural intensification, industrial concentration, and tourism development (rather than the

'economic development' *sensu lato*) were changing over 1996-2005. Although these findings are not conclusive, they suggest novel lines of investigation on regional disparities in the Mediterranean region (Leontidou and Marmaras 2001).

Conclusions

As a conclusion, let us remark the limits and advantages of the approach presented here. First, we preferred to adopt an exploratory rather than a regression approach, as the classical economic studies propose. One of the pitfalls of result's interpretation from the regression analysis is the fact that correlation not necessarily implies causation. In addition, simple statistical models based on linear regressions might miss important, non-linear relationships among variables. These weaknesses can be mitigated with the use of multidimensional techniques and non-parametric correlation, as it was illustrated in this paper. Obviously, it is also crucial to verify causation among the investigated processes, that is not the main task of multidimensional analyses. To achieve this goal, we are convinced that the effective multi-temporal evaluation of economic development may benefit from a holistic approach based on multi-scale quantitative models even coupled with qualitative approaches.

The results of this study thus encourage efforts towards more sophisticated models analysing empirically-based results. At this stage, a greater importance should be attributed to the geographical scale as an informative framework from both the positive and normative perspective (Salvati et al. 2012). As a matter of fact, both process understanding and policy implementation depend on the mutual interactions among the drivers of economic development that work differently at the various relevant scales, including the country, regional, and local ones. Only by rescuing the crucial role of scale and its influence in the economic dynamics at local scale we can offer a really novel contribution to the economically sustainable development of the Mediterranean region and beyond (Zuindeau 2006, 2007, Karlsson 2007).

References

ARBIA, G., PAELINCK, J., H., P. (2003), *Economic convergence or divergence? Modelling the interregional dynamics of EU regions 1985-1999,* Geographical Systems, 5, pp. 1 -24.

BARRO, R.,J., SALA-I-MARTIN, X. (2004*), Economic growth,* MIT Press, Cambridge, Massachusetts, USA.

BRUNORI, G., ROSSI, A. (2007), *Differentiating countryside. Social representations and governance patterns in rural areas with high social density: The case of Chianti, Italy,* Journal of Rural Studies, 23, pp. 183-205.

CASADIO TARABUSI, E., PALAZZI, P. (2004), *Un indice per lo sviluppo sostenibile,* Moneta e Credito, LVII, 226, pp. 123-150.

D'UVA, M., SIANO, R. (2011), *Time Series Approaches to Italian Regional Convergence,* Applied Economics, 43, pp. 4549-59.

DUNFORD, M. (2002), *Italian regional evolution,* Environment and Planning A, 34, pp. 657-694.

DUNFORD, M. (2008), *After the three Italies the (internally differentiated) North-South divide: analysing regional and industrial trajectories,* Annales de géographie, 6, 664, pp. 85-114.

DUNFORD, M., GRECO, L. (2007), *Geographies of growth, decline and restructuring: the rise and fall (privatization) of the state-owned steel sector and the trajectories of steel localities in the Italian Mezzogiorno,* European Urban and Regional Studies, 14, 1, pp. 27-53.

ESPOSTI, R. (2011), *Convergence and divergence in regional agricultural productivity growth: evidence from Italian regions, 1951-2002,* Agricultural Economics, 42, 2, pp.153-169.

GIUSTI, A., GRASSINI, L. (2007), *Local labour systems and agricultural activities: the case of Tuscany,* International Advances in Economic Research, 13, pp. 475 – 487.

ISTAT (2006), *Atlante statistico dei comuni. Rome,* Istituto Nazionale di Statistica.

KARLSSON, R. (2007), *Inverting sustainable development? Rethinking ecology, innovations and spatial limits,* International Journal of Environment and Sustainable Development, 6, pp. 273-289.

KING, R., DE MAS, P., BECK, J., M. (2001), *Geography, environment and development in the Mediterranean,* Sussex Academic Press, Brighton.

LEONTIDOU, L., MARMARAS, E. (2001), *From tourists to migrants: residential tourism and 'littoralisation',* in: Y. Apostolopoulos, P. Loukissas, and L. Leontidou, eds. Mediterranean tourism. Facets of socioeconomic development and cultural change, Routledge, London.

PATACCHINI, E. (2008), *Local analysis of economic disparities in Italy: a spatial statistics approach,* Statistical Methods & Applications, 17, pp. 85-112.

PROIETTI, T. (2005), *Convergence in Italian regional per-capita GDP,* Applied Economics, 37, pp. 497-506.

TERRASI, M. (1999), *Convergence and divergence across Italian regions*, Annales of Regional Sciences, 33, pp. 419-510.

SALVATI, L., ZITTI, M. (2007), *Territorial disparities, natural resource distribution, and land degradation: a case study in southern Europe.* Geojournal, 70, pp. 185-194.

SALVATI, L., ZITTI, M. (2009), *The environmental 'risky' region: identifying land degradation processes through integration of socio-economic and ecological indicators in a multivariate regionalization model,* Environmental Management, 44, 5, pp. 888-899.

SALVATI, L., SATERIANO, A., DI BARTOLOMEI, R. (2011), *The importance of being '(trans)-scalar': a comment on geography and the environment-economy relationship,* International Journal of Ecological and Economics Statistics, in press.

VIESTI, G., PELLEGRINI, G., IUZZOLINO, G. (2011), *Convergence among Italian Regions, 1861-2011*, Economic History Working Papers, Banca d'Italia, n. 22 October 2011.

ZUINDEAU, B. (2006), *Spatial approach to sustainable development: Challenges of equity and efficacy*. Regional Studies, 40, 5, pp. 459-470.

ZUINDEAU, B. (2007), *Territorial equity and sustainable development,* Environmental Values, 16, pp. 253-268.

Initial submission: 03.02.2013
Revised submission: 22.05.2013
Final acceptance: 31.05.2013

Correspondence: Consiglio per la Ricerca e la sperimentazione in Agricultura, Centro per lo studio delle Relazioni Pianta-Suolo (CRA-RPS), Via della Navicella 2-4, I – 00184 Rome, Italy.

E-mail: luca.salvati@entecra.it

Journal of Urban and Regional Analysis,
vol. V, 1, 2013, p. 77 - 88

SMART GROWTH AND THE CHALLENGE OF NIMBY: MULTIFAMILY DWELLINGS AND THEIR ASSOCIATION WITH SINGLE-FAMILY HOUSE SELLING PRICES IN TALLAHASSEE, FLORIDA, USA

Huston **GIBSON**[1] *Mathew* **BECKER**[2]
[1] Kansas State University, U.S.A.; [2] Sentinel Real Estate Corporation, U.S.A.

Abstract: Citizens protest development when they consider it undesirable. One type of development commonly perceived as undesirable by single-family home owners is proximate multifamily housing, often considered a cause of property devaluation. This study assesses multifamily housing, by typology, and its monetary association with proximate single-family housing prices. The research design is a cross-sectional study using multivariate regression. The unit of analysis is the detached single-family dwelling. The study population is a sample taken from all arms-length owner-occupied, primary residence, detached single-family property transactions recorded in Tallahassee-Leon County, Florida, USA, during 2008. The key findings show no statistically significant negative associations between multifamily housing and single-family property selling prices in the sample; in fact, the two were positively correlated. These findings address single-family homeowner concerns about proximate multifamily housing and should bolster the political feasibility of Smart Growth policy, which recommends denser urban infill

Key Words: *housing, land use, smart growth, neighborhood perception .*

Introduction

Homeownership is the single largest financial investment most people will make during their lifetime (United States Department of Housing and Urban Development 1995). Furthermore, housing choice can have implications for quality of life, so housing consumers make purchasing decisions based on many factors, including affordability, location, specific housing or property attributes, and/or the characteristics of the surrounding neighborhood (Tiebout 1956, Fischel 2000). Because external neighborhood qualities are part of the decision to buy a house, it can also influence the monetary value of housing. Thus, neighborhood activities are important to many homeowners. Accordingly, NIMBY ("not in my backyard") activism is frequent amongst homeowners. NIMBY citizens will participate in local government to protest development in their neighborhoods when they consider the development undesirable. One potential type of neighborhood development often perceived as undesirable by single-family homeowners in the United States (US) is multifamily housing. US single-family homeowners will regularly protest proposed multifamily construction when it is close to their house because they fear property devaluation (Pendall 1999). However, no substantial empirical evidence shows higher density developments causes any real reduction to surrounding single-family property values. In fact, the opposite may be true.

In 1997, the United States National Association of Home Builders (NAHB), using US Census and American Housing Survey data, found that the average value of a single-family house in

the US within 91.44 meters (300 feet) of multifamily residences increased in value at a slightly higher rate than single-family houses without multifamily residences nearby, at 2.9% versus 2.7% per year (Haughey 2005, United States National Association of Home Builders 2004). Granted, a concerned single-family homeowner might be a bit skeptical of this statistic, not just because of the source, but because the statistic is based on a national dataset. To illustrate, many multifamily dwellings (e.g., condominiums) are often found on or near an amenity, such as a beach, ski resort, or a thriving urban node. Logically, single-family properties proximate to these same amenities will also be proximate to the multifamily residences; capitalizing on the same amenity will bring up the national average substantially. This logic follows the basic principle of Alonso's classic Bid Rent Theory, based on the von Thunen model of land use, stating that as distance increases from a central node, so do transportation costs/time, and therefore rents will decrease (Alonso 1960). Thus, a local amenity may act as a central point for housing price premiums, trumping, at the aggregate level, any nuisance imposed by multifamily dwellings.

Either way, the fact remains that community residents across the nation regularly protest new multifamily housing developments proposed for their neighborhoods (Babcock 1966, Scott 1969, Plotkin 1987, Pendall 1999). An investigation of 182 proposed housing developments in the San Francisco Bay Area during the late 1980s showed that multifamily projects were most likely to encounter NIMBY resistance. In the San Francisco Bay Area study, Pendall found 61% of all projects prompted some form of public opposition, but multifamily projects were 42% more likely to generate public controversy than other proposed developments (Pendall 1999).

Even though studies examining the effects of subsidized housing on surrounding property values generally show no monetary effect on surrounding property values (Haughey 2005, Nguyen 2005, Pollakowski 2005), one likely issue with multifamily housing in the US is that it can be associated with more "affordable" housing, attracting lower income and ethnic minority residents. Despite continuous and significant improvements in racial attitudes amongst US Whites, race still partly explains today's housing segregation (Charles 2005, Ihlanfeldt and Scafidi 2004). When Ihlanfeldt and Scafidi (2004) interviewed housing consumers in Atlanta, Boston, Los Angeles, and Detroit to investigate neighborhood racial composition and the willingness to live in a neighborhood, they found that more Black residents meant fewer Whites were willing to live in that neighborhood. In 2000, Pendall conducted an analysis of survey data collected in 1994 for 1,510 localities (including counties, cities, and towns) in the largest 25 metro areas in the United States to investigate low density zoning and racial exclusion. He found a positive correlation. So, while the exclusionary measures may be indirect, they are effective (Pendall 2000).

To further confirm the trend in housing values, Pollakowski (2005) looked at seven multifamily housing developments in suburban Boston that contained at least 20% subsidized units and were built between 1986 and 2002, following the developments over time and examining surrounding property values to control communities and found no significant differences in property values between study areas and control areas. In another study by the Family Housing Fund in Minnesota, subsidized rental housing did not affect surrounding housing prices (Haughey 2005). In a related study in the San Francisco Bay Area that analyzed the effects of six new multifamily subsidized housing developments on near-by housing units, again no significant adverse effects on nearby housing units were found. In fact, in the San Francisco Bay Area study, some neighboring house values increased as the property was closer to the development (Cummings and Landis 1993).

Whatever the reasons, single-family NIMBY activism against multifamily housing has a very

real and direct conflict with Smart Growth. The Smart Growth Network (2006) suggests that: "[g]rowth is smart when it gives us great communities, with more choices and personal freedom, good return on public investment, greater opportunity across the community, a thriving natural environment, and a legacy we can be proud to leave our children and grandchildren" (Smart Growth Network 2006, p. 4). Smart Growth directly calls for both density and mixed land uses. The underlying principles of Smart Growth advocate providing a range of housing opportunities and choices: walkable neighborhoods; a mixture of land-uses; preservation of open space, farmland, and natural, beautiful, and environmentally critical areas; a variety of transportation choices (like public transit); and compact building design. Each of these principles requires densities other than single-use, detached, single-family suburban style housing (Smart Growth Network 2006).

While lower density, outward expanding development can have certain quality of life benefits, such as access to environmental amenities and larger houses, it can also cost communities financially via infrastructure and service costs and socially via resident fragmentation and longer commute times (Burchell et al. 2005). Even in communities with growth management regulations like urban growth boundaries to help reduce sprawl (Anthony 2004), such land use regulations may actually increase housing costs if housing options at multiple densities are not available (Ihlanfeldt 2007, Nelson et al. 2002).

Accordingly, Smart Growth promotes dense infill development with a mixture of land uses. Consequently, NIMBY activism against multifamily dwellings directly conflicts with Smart Growth, making Smart Growth principles politically difficult to implement in many communities (Downs 2005, Knaap and Frece 2007). Vocal NIMBY opposition to proposed multifamily housing infill developments can result in project denial (Pendall 1999), which may cause a lack of affordable housing, exclusionary communities, regional economic spatial mismatch between a region's jobs and workforce, and limited access to certain coveted public goods and services like highly valued school systems.

Concerns about property values are understandable, particularly in today's post mid-to-late 2000s housing crash era (Daivs 2010, Li 2011). Property is an investment, and people will naturally want to protect their investments. This is logical. However, unfounded individual concerns that create real costs to society must be addressed and removed from popular discourse as we move forward.

Materials and Methods

Despite the push for density from anti-sprawl coalitions and Smart Growth advocates, as well as the lack of evidence that multifamily housing developments have negative effects on surrounding single-family property values, NIMBY thinking and action is common in the United States. The result of opposition to proposed multifamily housing developments can lead to a lack of affordable housing and exclusionary communities, regional economic spatial mismatch between a region's jobs and workforce, and general barriers to geographies of opportunities like high quality school systems (Ihlanfeldt 2007, Briggs 2005).

This study assesses multifamily housing intrinsically and by typology: duplexes (two attached units), triplexes (three attached units), quads (four attached units), townhouses (five or more units of row housing), condominiums (five or more units of stacked housing), and apartments (five or more units of stacked rental housing with a single owner). We examined the association with single-family housing prices. Apartments are rental only, but other housing typologies

(including single-family) may be rentals or owner occupied.

Our central research question asked:

> *Is there a correlation between proximate types of multifamily dwellings and single-family housing prices, and if so, what are the directions and magnitudes of these associations?*

The central hypothesis tested was that:

> *Proximate multifamily dwellings do have a significant negative correlation with single-family housing prices, and the more intense the multifamily housing type, the greater the negative association.*

For this study, the unit of analysis was the detached single-family property, a parcel of land containing only one residential unit. The study population was a sample of all owner-occupied, primary residences, detached single-family housing units; we used arms-length property transactions recorded in Tallahassee-Leon County, FL, during the calendar year of 2008. All transactions were recorded by the local county property appraiser's office and warehoused with the Florida Department of Revenue. All data in the sample were derived from the Florida Department of Revenue Final Real Property Tax Rolls and accompanying Geographic Informational System (GIS) files (Florida Department of Revenue 2008). Tallahassee is the state capital of Florida; US Census population estimates from July 1, 2008, indicate Tallahassee-Leon County housed 264,063 persons with 159,012 persons actually residing in the City of Tallahassee. This equals 69,173 single-family houses, with a total of 2,027 qualifying transactions for the study sample (United States Census Bureau 2008).

Because we were particularly interested in any monetary association between single-family property and nearby multifamily development, we used a cross-sectional multivariate regression (aka a "hedonic price model") to analyze the data. Hedonic price models assume that price is a function of an item's own features, plus all other associated attributes (Sirmans et al. 2005). In this case, we assumed that the selling price of a property is the sum of its own physical characteristics, its location, and any surrounding [external] characteristics.

The dependent variable in this study was the dollar amount of qualified arms-length transactions for owner-occupied, primary single-family detached residential property in Tallahassee-Leon County. Of a total 2,027 qualified observations, the average selling price was $193,918.70, with the standard deviation from the mean being $76,228.41 and a range of $35,000 to $400,000.[1)] The month of the transaction was included in the model to control for seasonality of housing transactions, which spike during the summer months. The month of transaction was a dummy variable, based on the month of recorded transaction.

The internal property characteristics included in the model for control were the size of the unit's living space, the age of the residential structure, and the lot size. While a wide range of very specific housing characteristics might be considered in an individual's purchasing decision,

1) Sample range chosen to exclude housing transactions recorded as uncharacteristically high or low for the sample population. This meant dropping 149 homes that sold for more than $400,000, essentially all homes outside the upper quartile because homes in the upper echelon of the market will skew results, thus not giving the clearest picture of "typical" housing costs in the area.

these variables control for most differences in single-family housing stock. For example, the age of the house will proxy for features of architectural trends, and the total living space in the house will control for the likely number of bedrooms, and so forth. The external property variables included in the model for control were the property's distance from downtown, which is a proxy for commute times and other locational attributes; the taxing authority, a proxy for taxes levied versus the services rendered; and the Census Block Group, a proxy for fixed neighborhood characteristics.

The independent variable of particular interest was the proximity of single-family house to multifamily housing. Through experimentation with various buffers around multifamily properties, the most logical breaks were 45.72 meters (150 feet) and 91.44 meters (300 feet). The 45.72 meter (150 foot) buffer was optimal for selecting single-family properties directly adjacent to multifamily properties; this buffer distance will hereafter be called "adjacent." The 91.44 meter (300 foot) buffer included single-family properties close but not directly adjacent to multifamily properties; this buffer distance will hereafter be called "nearby." The National Association of Home Builders (2004) study also used a 91.44 meter (300 foot) buffer in their analysis. A larger buffer included too many of the county's total recently sold single-family properties. A visual inspection determined which multifamily property types would be included as buffer originators. Within the nearby buffer, 105 houses were proximate to duplexes, 23 to triplexes, 47 to quads, 148 to townhouses, 15 to condominiums, and 110 to apartments. Within the adjacent buffer, 62 houses were proximate to duplexes, 8 to triplexes, 30 to quads, 77 to townhouses, 6 to condominiums, and 57 to apartments.

Our applied regression models were as follows:

$$\textit{[1] selling price} = B_0 + B_1(\textit{proximity to multifamily}) + B_2(\textit{living space}) + B_3(\textit{lot size}) + B_4(\textit{age of house}) + B_5(\textit{distance from downtown}) + B_6(\textit{census block group}) + B_7(\textit{tax authority code}) + B_8(\textit{month of transaction}) + e$$

$$\textit{[2] selling price} = B_0 + B_1(\textit{proximity to duplex}) + B_2(\textit{proximity to triplex}) + B_3(\textit{proximity to quad}) + B_4(\textit{proximity to townhouse}) + B_5(\textit{proximity to condominium}) + B_6(\textit{proximity to apartments}) + B_7(\textit{living space}) + B_8(\textit{lot size}) + B_9(\textit{age of house}) + B_{10}(\textit{distance from downtown}) + B_{11}(\textit{census block group}) + B_{12}(\textit{tax authority code}) + B_{13}(\textit{month of transaction}) + e$$

When checking for violations to the assumptions of Ordinary Least Squares (OLS), variance inflation factor (vif) was used to test for multicollinearity. All variable scores were less than 4.0 and therefore acceptable. To test for spatial autocorrelation, a Moran's I (index of spatial autocorrelation) was used, and the test indicated a fairly random distribution within the sample (Mitchell 1999). A Breusch-Pagan/Cooks-Weisberg test for heteroskedasticity indicated a lack of constant variance, however, so robust standard errors was applied to down-weight influential observations in the regression (Chatterjee and Hadi 2006, Hoffman 2004). Visual diagnostics indicated that the sample displayed a positively skewed histogram of selling price. However, the central limit theorem states that for larger samples, the distributions of the averages will approach normal regardless of the sample's distribution shape, so this was not a concern (Agresti and Finlay 1997). No other issues were identified during diagnostics.

Table 1 lists and briefly describes all study variables and data sources. Table 2 displays the descriptive statistics.

Table 1

Descriptions of Variables

Variable	Description
Selling price	US dollar amount, arms-length real estate transaction, owner-occupied, primary single-family detached residential property
Proximity to multifamily	distance in meters/feet from parcel to multifamily unit housing (buffer)
Living space	total (adjusted) square meters of living space (computed in square feet)
Lot size	total hectares (computed in acres)
Age of house	2008 minus year house originally built
Distance from downtown	distance in kilometers from parcel to center point in downtown (computed in miles)
Census Block Group	geographic identification number
Tax authority	whether the parcel is in the city or the unincorporated county
Month of transaction	month of recorded real estate transaction

Table 2

Descriptive Statistics

Variable	Range	Mean/*Standard Deviation* or Percent/*Frequency*
Selling price	$35,000; 400,000	$193,918.70 *$73,962.06*
[If] adjacent to multifamily (45.72 meters/150 feet)	0;1	8.58% *174*
[If] nearby multifamily (91.44 meters/300 feet)	0;1	13.62% *276*
Living space	195.07sqm (640sqft); 1,725.17sqm (5,660sqft)	541.16sqm (1,775.46sqft) *183.07sqm (600.64sqft)*
Lot size	.04h (.09ac); .98h (2.43ac)	.2h (.50ac) *.08h (.20ac)*
Age of house	0; 83	17.49 *13.41*
Distance from downtown	0.51k (.32mi); 41.88k (26.02mi)	8.29k (5.15mi) *4.6k (2.86mi)*
In city	0; 1	66.65% *1,351*

Notes: *n* = 2,027; sqm = square meters; sqft = square feet; h = hectares; ac = acres; k = kilometers; mi = miles; Census Block Group and month of transaction also regressed, as Stata generated categorical dummy variables for control purposes; distance from downtown remained in its linear form for regression.

Results and Discussion

Of the 2,027 single-family properties in the sample, 276 or approximately 14% were nearby

(within 91.44 meters/300 feet) of one of the six types of multifamily housing, and 174 or approximately 9% were adjacent (within 45.72 meters/150 feet). Overall, single-family properties selling within these buffers sold for more than the typical single-family properties in the 2008 Tallahassee-Leon County stock. Single-family properties adjacent to multifamily housing sold for $7,206.68 more on average, and single-family properties near multifamily housing sold for $8,244.91 more on average. In addition to being positive, these coefficients were significant at alpha level .01. This correlation holds with all else being equal in the model: living space, lot size, age of house, distance from downtown, and whether the property was within the city limits. Of the control variables, all but the distance from downtown variable demonstrated statistical significance.

Of the multifamily housing, however, only townhouses and apartments had statistically significant relationships at the individual typology level. Single-family properties adjacent to townhouses sold for $5,679.47 more on average, and single-family properties near townhouses sold for $6,330.26 more on average. These coefficients were significant at alpha level .05. Single-family properties adjacent to apartments sold for $13,427.87 more on average, and single-family properties near townhouses sold for $9,372.91 more on average. These coefficients were significant at alpha level .01 for adjacent housing, and .10 for nearby housing. Please see Table 3 for all regression outputs.

After the initial adjacent and nearby buffer tests, further visual inspection was conducted; any single-family properties in the sample within the designated buffer areas judged not to be reasonably affected by the presence of proximate multifamily housing were noted. This could be because of design, such as the presence of a natural barrier like a dense area of vegetation between the single-family and multifamily housing. A dummy variable was used to indicate single-family housing judged potentially affected by multifamily units versus single-family housing with no visual effect from multifamily units (regardless of proximity). The regressions were then run again, but no combination resulted in any substantial changes to our initial results.

Finally, even though robust standard errors were figured to down-weight any possible influence of observation in all the regressions, the regression was run yet again without any data outside of the respective interquartile range. This time, the observations dropped included nine houses more than 60 years old, eighteen houses with more than 1066.8 square meters (3,500 square feet) of living space, and seventy-four houses on more than .36 hectors (nine tenths of an acre). Again, however, no noteworthy changes in the findings were derived from these revisions.

One aspect not captured by this model was the price structure for multifamily dwellings. Changing demographics, specifically characteristics like age, affect the escalating demand for multifamily dwellings, especially in areas conveniently located to various urban design amenities, such as walkable mixed-use neighborhoods (Nelson 2012). While proxies were included to control for fixed metropolitan locational and neighborhood characteristics, the cumulative finding of increased value of single-family housing proximate to multifamily housing may be, in part, a response to capturing the benefits of a transition zone.[j] To better understand how this phenomenon might influence overall single-family house selling prices in today's cities, further research is warranted. In fact, the findings from our analysis generate new questions for future study.

Table 3

Regression Outputs

Variable	Adjacent	Nearby
Proximate to multifamily	7,206.68*** (2,106.20)	8,244.91*** (2,550.87)
Proximate to duplex	-1,570.54 (3,419.84)	5,643.85 (4,261.71)
Proximate to triplex	2,588.259 (9,770.96)	3,721.067 (14,280.05)
Proximate to quad	-6,336.50 (5,313.03)	-389.07 (6,350.41)
Proximate to townhouse	5,679.47** (2,528.45)	6,330.26** (3,185.32)
Proximate to condominiums	9,338.09 (10,735.20)	8,900.07 (23,998.22)
Proximate to apartments	13,427.87**** (3,725.02)	9,372.91* (4,972.92)
Living space	88.89**** (2.810)	89.23**** (2.81)
Lot size	7,105.70* (3,707.20)	7,220.14* (3,746.29)
Age of house	-872.54**** (73.33)	-868.69**** (74.370)
Distance from downtown	.28 (.27)	.29 (.28)
In city	8,686.89*** (2,929.18)	8,996.79** (2938.57)
Adjusted R-square (Prob > F = 0.0000)	0.8803	0.8795

Notes: coefficients (robust standard errors); *n* = 2,027; *P < .10; **P < .05; ***P < .01; ****P < .001; negative coefficients noted by "-"; Living space computed in feet, Lot size computed in acres, Distance from downtown computed in miles

Conclusions

We found no statistically significant negative associations between multifamily housing and single-family property selling price in this study. In fact, we found the opposite both overall and individually for the typologies of townhouses and apartments. A townhouse is perhaps the most non-intrusive form of multifamily housing, and it was not uncommon to find this type of development in upscale Tallahassee neighborhoods, so finding this type of multifamily dwelling positively correlated with single-family property price was a rather bland finding. Apartments, on the other hand, were potentially the most perceivably intrusive of the six multifamily typologies, and the positive finding for this typology perhaps warrants further consideration.

One logical explanation for this positive association was that high density apartments were, by zoning and design, in mostly dense urban settings, close to urban amenities, thereby making the land valuable and thus prime for multifamily development. Thus, logically, the proximate single-family property will capitalize on the same urban amenity and therefore the monetary land value for the area. This is consistent with the explanation offered in the National

Association of Home Builder's (2004) study. Future study on community amenity could verify this hypothesis, but the speculation is certainly reasonable.

Another aspect to consider in future study is the price structure of the multifamily dwellings. As US Baby Boomers downsize, seeking homes with less maintenance, in neighborhoods with more walkable amenities and as Gen Y begins to reject the normative concept of suburban homeownership as the "American Dream" in an effort to be more flexible and resilient in their lives (Nelson 2012), we must examine the future of our cities, not just housing options and markets, but overall urban form. Yesterday's middle-class, single-family, home owning suburbanite NIMBY may very well be tomorrow's multifamily urban dweller. This will change the traditional perception of residents. As population dynamics change, so do wants, needs, markets, perceptions, and politics. As with most social science research, studies often raise more questions than they provide answers. This study is no exception and this is actually a positive outcome. As a result, we begin to ponder bigger questions upon drawing our conclusions. We wonder, for example, how the findings in this study relate to shifts in tomorrow's urban planning and design, and how the politics of Smart Growth will change. Is the single-family house tomorrow's "nuisance" on functional society? We can, of course, only speculate, but we do know that urban planners have been attempting to combat the costs of suburban sprawl for decades (Burchell et al. 2005), and the Smart Growth agenda is at the forefront of that effort (Smart Growth Network 2006).

Finding no statistically significant negative correlation between the selling prices of proximate multifamily housing and single-family property was fully in line with all previous studies reviewed, providing further evidence that directly contradicts commonly stated NIMBY concerns of monetary devaluation to surrounding single-family property when multifamily housing is close. If a single-family housing consumer simply prefers not to live near dense housing populations or large structures for personal and/or aesthetic reasons, this study cannot argue with that preference. However, the monetary argument stating that multifamily housing is a negative influence on single-family property value was not substantiated by this study. In fact, monetarily speaking, multifamily development proximate to single-family property is more likely to be positively associated with single-family property selling prices. Thus, single-family homeowners should perhaps rejoice when new multifamily neighbors arrive.

Nonetheless, the authors hope that these results will both help alleviate the concerns of single-family homeowners, monetarily speaking, and help local governments feel more comfortable creating and implementing policies that are more conducive to Smart Growth.

References

AGRESTI, A., FINLAY, B. (1997), *Statistical Methods for the Social Sciences*, Third Edition, Upper Saddle River, NJ: Prentice Hall.

ALONSO, W. (1960), *A Theory of the Urban Land Markets*, Papers and Proceedings of the Regional Science Association, 6, pp. 149-157.

ANTHONY, J. (2004), *Do State Growth Management Regulations Reduce Sprawl*, Urban Affairs Review, 39, 3, pp. 376-397.

BABCOCK, R., F. (1966), *The zoning game: Municipal practices and policies*, University of Wisconsin Press, Madison.

BRIGGS, X., editor (2005), *The Geography of Opportunity: Race and Housing Choice in Metropolitan Community*, Brookings Institution Press, Washington DC.

BURCHELL, R., W., DOWNS, A., MCCANN, B., MUKHERJI, S. (2005), *Sprawl Costs:*

Economic Impacts of Unchecked Development, Island Press, Washington DC.

CUMMINGS, P., LANDIS, J. (1993), *Relationships between affordable housing developments and neighboring property values: An analysis of BRIDGE Housing Corporation developments in the San Francisco Bay Area*, Working paper 599, Institute of Urban and Regional Planning, UC Berkley.

CHARLES, C. (2005), *Can We Live Together? Racial Preferences and Neighborhood Outcomes*. *In The Geography of Opportunity: Race and Housing Choice in Metropolitan Community*, edited by X. Briggs, Brookings Institution Press, Washington DC.

CHATTERJEE, S., HADI, A., S. (2006), *Regression Analysis by Example*, Hoboken, NJ: John Wiley and Sons, Inc.

DAIVS, M., A. (2010), *Reflections on the foreclosure crisis*, Land Lines, July, pp. 1-8.

DOWNS, A. (2005), *Smart Growth: Why We Discuss It More than We Do It*, Journal of the American Planning Association, 71, 4, pp. 367-378.

FISCHEL, W. (2000), *The Homevoter Hypothesis*, Harvard University Press, Cambridge, Massachusetts.

FLORIDA DEPARTMENT OF REVENUE (2008), *Final Real Property, Tax Rolls,* Tallahassee, Florida.

HAUGHEY, R., M. (2005), *Higher Density Housing: Myths and Facts*, The Urban Land Institute, Washington DC.

HOFFMAN, J., P. (2004), *Generalized Linear Models: An Applied Approach*, MA: Pearson Education Inc., Boston.

IHLANFELDT, K. (2007), *The Effect of Land Use Regulation on Housing and Land Prices*, Journal of Urban Economics, 61, 3, pp. 420-35.

IHLANFELDT, K., SCAFIDI, B. (2004), *Whites' neighbourhood racial preferences and neighbourhood racial composition in the United States: evidence from the multi-city study of urban inequality*, Housing Studies, 19, 3, pp. 325-359.

KNAAP, G., J., FRECE, J.,W. (2007), *Smart Growth in Maryland: Looking Forward and Back*, Idaho Law Review, 43, pp. 1-30.

LI, Y. (2011), *Geography of Opportunity and Residential Mortgage Foreclosure: A Spatial Analysis of a U.S. Housing Market*, Journal of Urban and Regional Analysis, 3, 2, pp. 195-214.

MITCHELL, A. (1999), *The ESRI guide to GIS analysis*, ESRI Press, Redlands, California.

NELSON, A., C. (2012), *Reshaping Metropolitan America: Trends and Opportunities to 2030*, Island Press, Washington, DC.

NELSON, A., C., PENDALL, R., DAWKINS, C., J., KNAPP, G. J. (2002), *The Link Between Growth Management and Housing Affordability: The Academic Evidence*, Brookings Report, Brookings Institution Press, Washington DC.

NGUYEN, M., T. (2005), *Does Affordable Housing Detrimentally Affect Property Values? A Review of the Literature,* Journal of Planning Literature, 20, 1, pp. 15-26.

PENDALL, R. (1999), *Opposition to Housing: NIMBY and Beyond*, Urban Affairs Review, 35, 1, pp. 112-136.

PENDALL, R. (2000), *Local land use regulation and the chain of exclusion*, Journal of the American Planning Association, 66, pp. 125-142.

PLOTKIN, S. (1987), *Keep out: The struggle for land use control*, Univserity of Califorinia Press, Berkeley.

POLLAKOWSKI, H. (2005), *Effects of Mixed-Income Multifamily Rental Housing Developements on Single Family Housing Values*, MIT Center for Real Estate, Cambridge.

SCOTT, M. (1969), *American city planning since 1890*, University of California Press, Berkeley.

SIRMANS, G., D., MACPHERSON, D., ZIETZ, E., N. (2005), *The Composition of*

Hedonic Pricing Models, Journal of Real Estate Literature, 12, 1, pp. 3-43.

SMART GROWTH NETWORK (2006), *This is Smart Growth,* Retrieved from: http:// www.smartgrowthonlineaudio.org/pdf/TISG_2006_8-5x11.pdf.

TIEBOUT, C. (1956), *A Pure Theory of Local Expenditures*, Journal of Political Economy, 64, pp. 416-424.

UNITED STATES CENSUS BUREAU (2009), *Population Estimates*, Information retrieved from the web December 2009, http://quickfacts.census.gov/qfd/states/12/12073.html & http://quickfacts.census.gov/qfd/states/12/1270600.html.

UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (1995), *Homeownership and Its Benefits*, Office of Policy Development and Research, Urban Policy Brief, 2(August), Washington DC.

UNITED STATES NATIONAL ASSOCIATION OF HOME BUILDERS (2004), *Market Outlook: Confronting the Myths about Apartments with Facts*, Washington DC.

Initial submission: .29.01.2013
Revised submission: 03.05.2013
Final acceptance: 31.05.2013

Correspondence: Huston J. Gibson, Landscape Architecture/Regional and Community Planning, The College of Architecture, Planning & Design, Kansas State University, 302 Seaton, Manhattan, KS 66506-2902

E-mail: hgibson@k-state.edu

Journal of Urban and Regional Analysis,
vol. V, 1, 2013, p.89 - 98

RETHINKING THE TERRITORIAL PACT IN THE CONTEXT OF EUROPEAN TERRITORIAL COHESION

Irina **SAGHIN**[1)], *Gabriel* **PASCARIU**[2)], *Daniela Rodica* STOIAN[1)],
Ilinca-Valentina **STOICA**[1)], *Daniela* **ZAMFIR**[1)]
[1)] University of Bucharest, Interdisciplinary Centre for Advanced Research on Territorial Dynamics, [2)]"Ion Mincu" University of Architecture and Urbanism, Bucharest, Romania

Abstract: The authors argue through this paper, the importance of rethinking the recently abandoned tools that can be reactivated in times of crisis. EU 2020 Strategy and other EU documents create a favorable frame in order to achieve the priorities set by reconsidering the territorial pact concept. Recent documents define the partnership agreement concept, which seems to be more rigid and less flexible than the territorial pact. Having as a starter point Romania's specifics, there are individualized 10 thematic territorial pacts and 8 global pacts. They must generate territorial synergies capable of ensuring the coherence between regions, states and the European Union as a whole.

Keywords: *territorial pact, partnership agreement, EU 2020 Strategy, territorial cohesion, sectoral/thematic pact, global pact.*

Introduction

Europe is undergoing a period of major transformations caused by the persistence, scale and impact of the economic and financial crisis. As a direct consequence in the spatial plan, a profound reshuffle of the territorial structures can be distinguished from local to global levels (Kiss 2011). Optimistic forecasts encounter certainty and recent developments show that there is not systematic failure in capitalism (Harvey 2010) and that this is unpredictable in duration. Therefore, searching for solutions, one of the current questions relates to the direct and indirect potential that could have a proper spatial development upon mitigating the crisis. In the context of the reinforcement necessity for the role of states in the development process, getting back its fundamental function of regulator (Uzunov 2012), there is also a reconsideration of endogenous development, which involves additional security among space actors of a state union, of any State or region. Recent evolution show "re-teritorialization of the state" and "the re-scaling of state power" tendencies (Jones and Jessop 2010, p.1137), along with a tendency to increase the role played by the networks of territorial actors.

The context of territorial development is quite complex and does not seem to guarantee an evolution that brings, with certainty, sustainable development. Even though after 2010 documents of great importance for European territorial development were defined and approved by 2020 (EU 2020 Strategy and the Territorial Agenda) without a coherent action at lower levels where there is no possibility to increase the response capacity of local and regional communities to the new challenges arising from the current crisis. In addition to the many tools and sets of austerity measures, an essential step should be the conscious assumption of responsibility for actions to implement joint projects. These can cover both sectorial and global aspects.

European policies have largely followed a path marked out by excessive neo-liberalism (Hadjimichalis 2011), which promoted a macro-economic planning from the top down and a dogmatic view, according to which the only process that can solve territorial disparities is competition, and in its subtle form, competitiveness. As not all European regions and cities can be competitive, then those that are will increase the competitiveness through cooperation with the others. If this process would also have a solid feedback, to be more precise some of the extra return value of increasing competitiveness by cooperating with regions and cities, then we could say that the mechanism works. However, this operation should not be considered solidarity (sometimes with humiliating connotations), but simply an act of territorial inherent regulation for an integrated European development process (Ianoş 2012).

To the current situation there is to be added one thing, emerged from the recent history of new states coming out from communist system, that didn't know to negotiate their entry into the European structures. Their lack of cohesion and the existence of individualism, emerged from the desire of each state to be better placed than others in matters of competition launched by the EU and it has been observed since the early 2000s (Kulcsar 2003). Therefore, taking into account that from an economic and social point of view there is to discuss about not only one single Europe but "many Europes" (Agnew 2001), there shall be required not only to develop a strategy, but a set of appropriate strategies for each group of countries or regions.

In this complexity, it is useful the rediscovery of tools and methods that have played a more or less important role in some recent history on territorial development. These tools include the **territorial pact,** appeared as a continuation of formalized cooperation between several local institutions and organizations. This formalizing occurred in early '90s in Italy (forms of cooperation have emerged since the early '70s), and later in Germany (Picchieri 2002). It appears that the formalization of the territorial pact was based on an idea of combining central and local policies (De Rita and Bonomi 1998), so that community projects would have been financed from government funds. Procedures have been regulated since 1995, an essential role being played by 'Comitato Interministeriale per la Programmazione Economica'. In most of the cases, the territorial pacts in Italy focused on local development with industrial districts in the center (Clerici, 2004). The current complexity of the territorial reality demands flexibility in organizing the production process which implies a high interconnexion, a more complicated network between all the actors (Grosjean and Crevoisier 2003).

The territorial pact concept is more complex than the one frequently used to offer support to institutions by different actors in the socio-economic, financial, cultural life. It is known that the operation of every institution implies an agreement, a pact between all these actors. They accept the rules set by the institutions, although sometimes they are in competition. Therefore, a pact to support the institutions is created, one that regulates the socio-economic processes (Schneider 2006). The teritorial pact can be seen as a part of the integrated development model at a regional and loca scale, sustaining the endogeneous development (Christofakis 2001).

The most important success represents the pacts focused on solving social problems, especially those relating to territorial employment (Elisei 2012). Even the European Commission approved the European Employment Pact in 1996, insisting on the idea of multiplying effects in using Structural Funds for territorial development.

As globalization has positive effects on local and regional economies, the territorial pact by reporting to the local, rarely regional, but apparently its numerous bureaucratic elements, was abandoned. Now that globalization has shown some limitations, returning to a different

territorial pact seems to be a good way of strengthening the regions and their subunits.

The current European context of 'reinventing the territorial pact'

At European level, territorial development policies are facing contradictory elements caused by the transition from a planning period (2007-2013) to another (2014-2020), given the conditions of a crisis that seems to be spreading throughout the 2nd decade of this century. Many documents, policies and thus instruments have been designed as a support tool to ensure territorial development and economic convergence at European level. In this regard, it is relevant the EU 2020 Strategy, launched in November 2009 and discussed in the European Parliament, the Council of Ministers and in other forums, in early 2010 (it was adopted in June 2010 at Brussels).

The main priorities of the strategy aims smart growth, by supporting the process of innovation and knowledge, sustainable growth, with an emphasis on resource efficiency and inclusive growth, by increasing labor force to ensure economic, social and territorial cohesion. These priorities are joined by seven programs to stimulate progress initiative "A European structure innovation", "Youth on the Move", "A Digital Agenda for Europe", "Efficient Europe in terms of resource", "An industrial policy for the globalization era", "An Agenda for new skills and jobs", "European platform against poverty". What the EU wants, through these initiatives, is to strengthen economic governance in order to end the crisis, governance that clearly needs a consistent and coherent regional support development. The implementation of these strategies will represent between others an important progress in achieving territorial cohesion at different levels. Acoording to some scientists, territorial cohesion is one of the concepts with a high innovative potential concerning European Commission purposed policies (Camagni 2010).

The interconnection of the three strategic pillars provides some coherence to the process of territorial development foreshadowed. Intelligent growth is based on improving education, achieving performance in research and technology transfer, thus being the engine of economic growth. Sustainable growth aims to increase competitiveness through efficient use of resources, especially nonrenewable, by accelerating the development of smart grids and strengthening the competitive advantage of European business environment. Sustainability will be the main product of such increases. The third pillar is inclusive growth so that every European citizen will have a job, will not be affected by poverty and will not feel discriminated. Only thus European resources can benefit to all regions, decreasing disparities and increasing territorial cohesion. On a more analyzed approach, it is clear that the first two pillars are the basis in achieving the third one; therefore we can not talk about inclusive growth, if do not have knowledge and necessary training and if resources are not used effectively divided.

Of the EU 2020 strategy there is notable the need to define localized policies and measures, the only ones able to eliminate long-term potential underutilization and reducing social exclusion. It is obvious that the key element in this strategy is the territory that has gained operational connotations, along with its transition from variables framework category to the dynamic variables, embedded in development. Cohesion policy, under all its aspects, integrates the 3 strategic pillars, projecting them in space.

Cohesion Policy 2014-2020 focuses on results by achieving territorial coherence and synergies and simplifying its implementation. Legislative architecture provides two regulations: one that defines the scope of the European Territorial Cooperation and the second one European Territorial Cooperation Group. This policy introduces some key changes in the wording of targets (which should be clear and measurable) and in terms of international and national legal

framework. In addition, the terms and conditions of financing differ from the period of 2007-2013; there are several conditionings, that we find both ex-ante and ex-post. The first category ensures the European Union there are conditions necessary for the expected investment funds (in 2007-2013 lack of such conditionality has led, in some cases, to the inability to absorb a large part of the funds in European countries such as Romania), and the second one is designed to encourage and reward states that have fulfilled their objectives. Formally, this policy is correct, but not morally! There are at least some elements that have not been taken into account: all states are treated as being experienced in accessing and using European funds; different levels of development and the inability of states to incur expenditure, for which reimbursement is being made at a specific time, that can reach or exceed one year; lack of European financial means to help countries have access to such funds; the return of funds to the developed countries will have the opposite effect on territorial cohesion.

A positive aspect of the cohesion policy that is to be implemented is the importance given to local development, led by communities, with innovative financial means and with a leadership strategy. Obviously, there is not to be forgotten the monitoring and evaluation component, that should be undertaken along with the basic elements in order not to be considered at the end of the projects that they have not followed the procedures because of ignorance or malice.

In defining territorial cohesion policy for the next period a vital significance will have regions which are classified into three categories. Besides weak regions and developed ones, a new category is represented by transition regions which will have GDP/capita between 75% and 90% of EU-27 average.

At the same time, the online environment will be placed on a more important position in territorial development and often there will be talks about the "e-cohesion" for a better control of projects and expansion. Therefore, all member states should have by the end of 2014 suitable systems to allow recipients have access to all information in electronic format, not just printed.

Regarding EU funds, the European Regional Development Fund, which aims to reduce disparities between regions, will focus on sustainable urban development; mainly there will be required the development and adoption of a list of cities where integrated actions will be undertaken to promote sustainable development.

The truly innovative element within the cohesion policy for 2014-2020 is the mechanism to facilitate and encourage integrated operations through Integrated Territorial Investments (ITI). ITI is a tool through which an operation can be supported by several priority axes and programs can be linked together through an integrated investment strategy for a particular area or a particular functional area. This mechanism may take the form of an integrated urban development strategy, but can also support an interurban cooperation for specific projects of mutual interest. Action plans together with this tool facilitate the movement of funds to the local level in management and partnership, if local governments will insert them into their development strategies.

The third major reference document in territorial development is the Territorial Agenda 2020, approved during the Inter Ministerial Informal Meeting responsible with Territorial development planning spaces on May 19, 2011, in Godollo, Hungary. Within six territorial priorities for EU development, priorities defined in the document mentioned above, there are found many aspects reinforcing the idea of defining and implementing a territorial pact. Of these, there is to be noticed the priority to encourage integrated development of cities, rural specific areas. Cities are encouraged to look beyond their administrative limits, focus on regional functions and also

to include in their projects peri-urban settlements, rural peripheral areas undeveloped and under-populated areas along with processes that disadvantage groups' segregation. With this priority, we foresee the existence and implementation of an expanded partnership, recognizing the interdependence between urban and rural areas. Managing these interdependencies and development process in such a framework can be possible only through integrated governance through partnership-based planning. Hence, the idea of redefining and reconsidering the concept of territorial pact as an integrator mean of regional policies aimed at achieving specific or global targets.

Territorial Pacts – concept and adaptive approaches

The Europe 2020 Strategy and Cohesion Policy talks about the Partnership Agreement, which is one of two major elements (along with Common Strategy Framework) of the programming period 2014-2020. It will replace the National Strategy Framework that will practically remain a starting point for further development of partnership agreements. This contract will be a joint document, a reference one that will require consistency, coherence and thematic focus, especially for Operational Programs, also being well defined and quite comprehensive in terms of national development programs.

One of the key positions of the Partnership Agreement aims the strategy for integrated approach to territorial development and the most affected regions in terms of poverty. It is desired for this document to be an effective coordination of policy instruments that impose a duty and commitment from both sides, both the member states and the European Union. This measure will be more difficult for member states to adopt because it requires a better coordination of policies than the National Strategy, but these contracts will be those that will initiate partnership commitments at national and regional level.

Italian roots of territorial pact

With this theoretical and instrumental support, Territorial Pacts are those on which current problems would apply, in order to change the approach to development issues and to define a new role for local initiatives. Analyzing various models at European level, it is clear that the Italian model of the so-called "patti territoriali" would be the correct tool for the situation in Romania, with some additional amendments. These "patti territoriali" opened new perspectives and launched a period of reforms for the Italian planning system, which, until then, the early 90s, was based primarily on rational-comprehensive model of overlapping plans (from detail to territorial scale).

This system still represents the base for territorial and urban development in Italy, but it has been enriched with a number of tools and policies that allow the management of urban and regional problems. Also, the tools have worked at various levels. Territorial Pacts (1994-1997) realized strategies at a sub-regional level, but there were also implemented programs for the city and district (ie, "Contratti di Quartiere" - 1996). Also projects supported and developed by the European Union contributed greatly to territorial development (ie. Urban I and II). To all this was added a crucial factor, the gradual process of decentralization of the Italian system of government.

Territorial pacts can be analyzed from several perspectives. If we start from the definition according to which "a Territorial Pact for Europe 2020 is an agreement between the governmental levels of a country (local, regional, national), then the parties signing it undertake to coordinate and synchronize their political agendas to focus on objectives and targets of 2020

Strategy through actions and financial resources ". In such a situation the national perspective is the one that prevails.

But what emerges from the existing documentation at European level is that these territorial pacts can play a vital role in territorial development through proper integration on several levels. It is a vertical, horizontal, conceptual, relational and functional integration that we should dwell upon, through a precise pact with an explicit partnership and a clear idea of development, in order to achieve coherence and cohesion of a region.

European experience, relatively limited in matters of territorial pacts, generally shows its dominance in inter-regional and local level. The idea of defining a national territorial pact as a tool for integrated territorial development is beneficial one, basing a type of strategy in which multistage association of local communities and socio-economic and cultural actors is the key of solving the common interest objectives.

The Committe of the Regions considers that in order to achieve the objectives in the EU 2020 Strategy, the Territorial Pact has to be promoted as a main tool to ensure territorial cohesion at a continental level. The territorial pact might be the link between the European Union Agenda, the national, regional and local programms correlated to the necessary resources to achieve the targets (Gill, Pereira and Teixeira 2010).

Territorial pact may be considered at national level as a significant document, with decisional effects only if it is able to coordinate, direct and produce integrated, consistent and sustainable territorial development. This is a tool through which territorial development strategies are implemented, promoting growth (as defined in Agenda 2020), by building partnerships between public and private actors.

A territorial pact should harmonize different territorial agendas of socio-economic actors, public administrations, at various levels, and other interested parties forming the partnership. Such a pact with national strategic territorial agenda at national level is correlated with the ones at lower levels: interregional, regional, county or local.

Territorial pact is closely related to a clearly defined territory, but also to a forced development idea for that territory. Partnership, public and private actors, along with identifying key or strategic projects, take over and implement the fundamental idea related to induction of territorial growth.

Developing an adaptive approach

By definition, the territorial pact, based on a realistic vision, will need to provide effective perspectives, policies and instruments at all main levels (national, regional, county, municipal) and intermediate individualized levels (urban areas, metropolitan areas, areas with a specific/ thematic ones). In other words, the territorial pact as a tool can be considered a network of connected initiatives in certain territories, involving network shares placed on a multistage (from local to national level).

A first approach for territorial pacts focuses on the importance of spatial scale. Thus, the territorial pact is always associated with a regional or sub-regional scale (inter-county), being a tool that works in a transversal way cross the administrative boundaries, and negotiates solutions for territorial development, mediating through institutional powers or/and private interests.

A second approach is the one taking into account their nature, aiming a specific target or another global one. Implementation of a territorial pact regarding integrated national development requires participation through cooperation of central actors in managing a network of territorial pacts. This management is based on the principle of negotiated programming, after which there are being financed projects proposed by regional, inter-regional, regional, county, local or inter-local pacts, after a preliminary assessment of applications. Vision of integrating these territorial pacts in networks and sub-networks contribute to an integrated development nationwide. These networks, subnets structured, include two categories of territorial pacts: sectoral (thematic) ones and global ones (Fig.1).

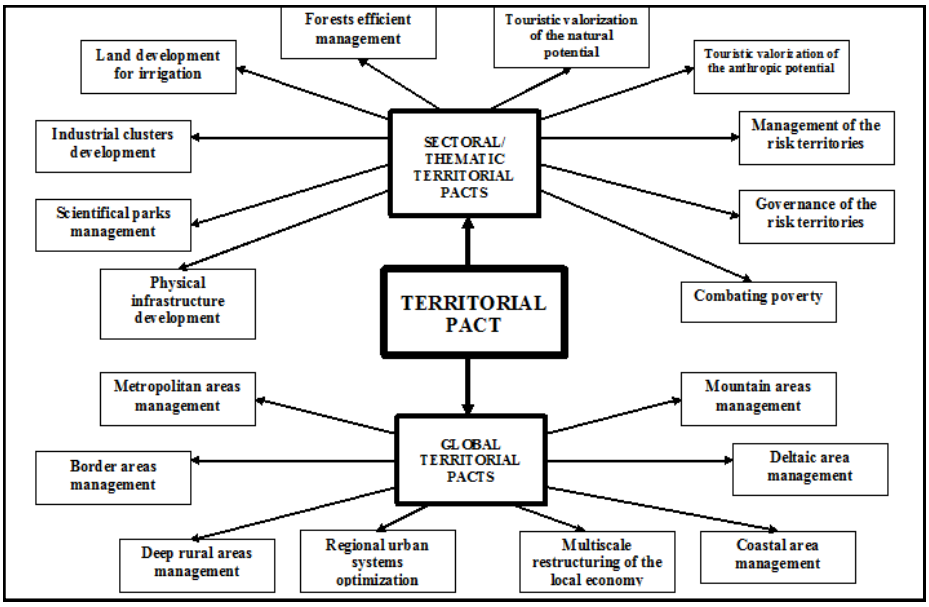


Fig.1 - **Territorial pacts typology**

Thematic territorial pacts are established by territorial actors at different levels to solve a problem faced by communities or achieve goals that integrate the projection of a coherent regional and national development. These territorial pacts are tools focused on achieving relatively punctual targets with effects in efficient structuring and planning functionality. Given the realities of the Romanian space, there can be individualized different thematic categories of territorial pacts, truly considered instruments in achieving the strategic objectives of territorial development in Romania. Among them, those that target the efficient management of some areas with different economic potential (touristic, agricultural, forestry) or of some protected areas, the industrial clusters development, the improvement of the territorial infrastructure or the control of some social phenomena with territorial projection.

Global pacts aim building partnerships between different actors and different levels of structure in order to boost sustainable management of different types of spaces. Targets are some focused on the development of the territories with a certain specific. Global territorial pacts are real territorial cohesion instruments and their implementation requires the existence of a flexible and very complex cooperation framework. As examples, specific for Romania, we can emphasize those that refer to different urban structures, to mountain or deltaic areas, to deep

rural areas or transboundary areas.

Conclusions

Territorial pacts defined above may be accepted as toolkits in achieving an integrated national development, involving both these horizontal and vertical cooperation. Central bodies included in such territorial pacts can print them towards national strategic objectives; even if each is founded on a force idea emerged of each structure.

The passage from the gouverment to the gouvernance is a process where the key role is played by the territorial capital. Through the territorial gouvernance, there is a structuring process with an infinity of relationships between different actors, interested and non-conflictuals (Davoudi et al. 2008). The logic connexion is that the territorial pact is the most efficient sollution to achieve territorial gouvernance in order to increase territorial cohesion from a local level to the European Union level in its integrity.

National integrated development territorial pact, supported by a network of territorial pacts, is a necessity. Turning it into reality involves a clear definition, in a European and national context, of the concept of territorial pact, but also the one of network of territorial pacts, on the one hand, and implementation methods, on the other hand. Analyses undertaken by the pilot territorial pacts can contribute to learning more unknown items, especially regarding their territorial implementation. Multi-level governance, differentiated on 4 levels (local, regional, national and European) in Europe (Painter 2008) can be supported by the existence of some pacts from the same area, or by the cross-level pacts. Territorial pacts can be considered an example of collective action that can be permanently improved (Perri 2003).

Essentially, territorial pact is a commitment that can provide some legal resources with role in regulating relations between partners (private and institutional). In addition to other agreements on territorial development, it suggests forms of cross-border agreements and multi-scale, with variable geometry, which are essential to rethinking how to manage territorial development processes through intelligent, creative, sustainable and inclusive growth.

Acknowledgements

Partially, this article was written using some results achieved in the ESPON 2013 PROGRAMME, Project 2013/2/19 Growth Poles in South East Europe GROSEE.

References

AGNEW, J. (2001), *"How many Europes? The European Union, eastward enlargement and uneven development"*, European Urban and Regional Studies, 8, 1, pp.29–38.

CAMAGNI, R. (2010), *Territorial Cohesion: A Theoretical and Operational Definition*, Scienze Regionali, 9, 1, pp.115-118.

CHRISTOFAKIS, M. (2001), *Local development and Regional Policy*, Papazisis, Athens.

CLERICI, M., A. (2004), *Patti territoriali e sviluppo locale: alcune riflessioni a partire dai distretti industriali*, Archivo di studi urbani e regionali, 80, pp.101-122.

DAVOUDI, S., EVANS, N., GOVERNA, F., SANTANGELO, M. (2008), *Territorial Governance in the Making. Approaches, Methodologies, Practices*, Boletín de la Asociación de Geógrafos Españoles, 46, pp. 33-52.

DE RITA, G., BONOMI, A. (1998), *Manifesto per lo sviluppo locale: Dall'azione di*

comunita ai patti territoriali, Bollati Boringhieri, Torino.

ELISEI, P. (2012), *The territorial Pacts, tools of regional and local development: from the Italian experience to the promotion of the Europe 2020 partnership*, Urbanismul, 11, pp. 102-109.

FALUDI, A. (2009), "*Territorial cohesion under the looking glass: synthesis paper about the history of the concept and policy background to territorial cohesion*", European Commission, Regional Policy, Inforegio.

GIL, D., PEREIRA, M., TEIXEIRA J., A. (2011), *The multi-scale approach of territorial cohesion: An analysis from the European Periphery, paper presented at the Conference "What future for cohesion policy? An academic and policy debate"*, 16-18 March 2011, Bled, Slovenia, Accessed at January 14 2013, in http://www.regional-studies-assoc.ac.uk/events/2011/mar-slovenia/papers/Gil.pdf.

GROSJEAN, N., CREVOISIER, O. (2003), *Autonomie differenciée des systèms de production territoriaux.* Revue d'Ėconomie Régionale et Urbaine, ADICUEER, 2, pp. 291-315.

HADJIMICHALIS, C. (2011), *Uneven geographical development and socio-spatial justice and solidarity: European regions after the 2009 financial crisis*, European Urban and Regional Studies, 18, 3, pp. 254-274.

HARVEY, D. (2010), *The Enigma of Capital: And the Crises of Capitalism*, Profile Books, London.

IANOŞ, I. (2012), *European Territorial Cohesion, between reality and imagination***,** paper presented at the The Second Romanian – Bulgarian – Hungarian – Serbian Conference "Geographical Research and Cross-Border Cooperation within the Lower Basin of the Danube", Eger, Hungary, September 20-23, 2012.

JONES, M., JESSOP, B. (2010), *Thinking State/Space Incompossibly*, Antipode, 42, 5, pp. 1119-1149.

KIS, E. (2011), *The impacts of the economic crisis on the spatial organization of Hungarian industry*, European Urban and Regional Studies, 19, 1, pp. 62-76.

KULCSAR, L. (2003), *Territorial Policy during the Post-Socialist Period in Hungary*, Eastern European Countryside, 9, pp. 145-158.

MEDEIROS, E. (2012), *Territorial Cohesion: a conceptual analysis*, Centre de Estudos Geograficos (CEG) – Institute of Geography and Spatial Planning (IGOT), Lisbon University, Accessed at December 15, 2012 in http://ww3.fl.ul.pt/pessoais/EduardoMedeiros/docs/PUB_PAP_EM_Territorial_Cohesion.pdf.

PAINTER, J. (2008), *European Citizenship and the Regions*, European Urban and Regional Studies, 15, 5, pp. 5-19.

PERRI, A. (2003), *Il patto territorial della Locride*, in: La Lezione dei patti territorili, Ministero dell'Economia e delle Finanze, Dipartimento per le Politiche di Sviluppo, Gennaio, pp. 429-459.

PICCHIERI, A. (2002), *La regolazione dei sistemi locali*, Il Mulino, Bologna.

UZUNOV, F., V. (2012), *State regulation as a factor in creating favorable conditions for economic activity of corporate enterprises within regions*, Actual Problems of Economics, 12, 138, pp. 95-105.

Initial submission: 16.08.2012
Last revised submission: 22.03.2013
Final acceptance: 31.05.2013

Correspondence: University of Bucharest, Interdisciplinary Centre for Advanced Research on Territorial Dynamics, 4-12, Regina Elisabeta Blv., 030018, Bucharest, Romania

E-mail: irinasaghin@gmail.com

Journal of Urban and Regional Analysis,
vol. V, 1, 2013, p. 99 - 102

BOOK REVIEWS

Socio-economic transformation in Bulgaria – Peculiarities and territorial differences

Margarita Ilieva, Sofia: TerArt, 2012, 344 p.
ISBN 978-954-9531-18-3
(in Bulgarian, summary in English 21 p.)

Reviewed by IRINA SAGHIN, University of Bucharest, Romania

The book represents the outcome of the research on transition processes in Bulgaria having been made by Prof. dr. hab. Margarita Ilieva during the past two decades. This is motivated by the need of a complex analysis of social-economic transformations in post-communist Bulgaria.

The objective of the study consists in the analysis of particularities of sociol-economic transformations in Bulgaria in the post-communist period as well as of their regional and local differences. The analysis has been done through illustrating the transformation effects in three different domains: national economy as a whole, one of the economic branches (agriculture), and one of the functional systems (labor market); special attention being paid on territorial differences.
The book is largely based on the thesis prepared for obtaining the dr. hab. degree, and thus bears the imprint of the formal thesis' structure and language.

The theoretical part of the work discusses various topics of social-economic changes, with special focus on the analysis of the term 'transformation' and its various meanings in geographical (and not only) literature. One of the crucial methodological aspects discussed in the book deals with measuring the degree of transformation. There is plenty of literature dedicated to various aspects of (economical) geographical transformations (more than 600 publications by international scholars as well as by Bulgarian, Polish, Hungarian, and Russian researchers are cited in the book). Professionals in economic and geographical research acknowledge that Eastern European countries are in transformation phase, a transition from centrally-planned to market economy. However, it is difficult to measure this transition, taking in consideration the great variety of 'market' economies. After the meaningful discussion of the issue, the work comes up with an integral indicator to measure the achieved level of transformation in the individual territorial unit.

According to the author, the transformation of agricultural sector plays critical role in post-communist evolution of the Bulgarian national economy thanks to the high share of this sector in socialist Bulgaria. Privatization in Bulgaria has been realized more slowly than in other transition countries. If considering employees in public vs. private sector, since 1999 even in the most disadvantaged regions private ownership of the means of production has become dominating. The author, based on the J. Kornai's (2008) criteria, concludes that the transformation of Bulgaria's economic system "has already been completed". However, it seems that the accomplishment of formal criteria has not led to the establishment of fully functional and competitive market economy. Reported issues refer to low attractiveness of Bulgaria for foreign investors, slow pace of the reforms and small share of processed goods in export trade as well as low labor productivity and obsolete production technologies.

The change in property structure was accompanied by the transformation of branch structure of the economy, from prevailing agriculture and industry at the beginning of transition period to services' increasing dominance at present. The author pays special attention on changes in agricultural sector. Its evolution in post-communist Bulgaria has not been very promising. In spite of long history and favorable natural conditions, agriculture has been declining. A long list of factors to hamper its development in the context of market economy is enumerated in the work. The author complains that land privatization, seen as one of the priorities of transition to market economy, has been realized in a "rather atypical for other countries ways", but has not accomplished its main goal: development of a competitive agriculture. Fragmented lands and small farms substantially undermine the efficiency of Bulgarian agriculture. Other directions of the land reform have not led to the expected results as well. In these circumstances the author underlines that the crisis in Bulgarian agriculture is much deeper than in other EU countries with socialist past.

Changes in the labor market are similar to the other Eastern-European transition countries. The author points out to the factors affecting regional labor markets: population decrease, aging, out-migration. Due to these factors, Bulgaria lost 22% of its labor force in the period 1988-2007. The author highlights the problem of discouraged people, not seeking any job, which forms a significant group on the national labor market. In the author's opinion, "delay" in the formation of the middle class in Bulgaria is one of the main consequences of labor crisis and of the high rates of unemployment.

The analysis of territorial differences shows a growing dispersion in the regions' economic development and increasing the gap between the leading region and the catching-up ones. At the same time, Bulgarian regions are among the poorest in EU27. Despite these pessimistic features, the author points out that economic hot-spots are present in all the regions, and "engines of growth" are spread all over the country. This might represent an advantage in the application of specific regional development policies, based on growth poles and growth centers. The analysis of regional disparities, made by the author, points to the opposition north vs. south: the southern part of the country is more developed than the northern one. A more detailed territorial analysis reveals the fact that impact of transition varied across districts. Big agglomerations with their administrative units are the primary beneficiaries of the transition. However, in the broader context of European transition, Bulgarian agglomerations are among the poorest ones.

The author highlights that in comparison to other Eastern-European countries, the Bulgarian transition was much slower and harder to pass through because of various domestic and foreign contexts, which have formed the "Bulgarian mode" of the reforms. While other countries, such as Poland, Slovenia, Hungary, Albania etc. reached the pre-transition level of GDP in the first ten years of post-communist transformations (1990-1999), Bulgaria achieves this target in 2007. Because of the "delayed" transition, the impact of the reforms was not the one expected. The author's conclusion about the transformation process is quite a pessimistic one: among the transition countries Bulgaria is rather a "loser".

We can conclude that the book represents quite a deep radiography of several main aspects of Bulgarian economic transition to the market economy. One would expect that such a work should end up providing practical recommendations to improve economic development policy. In such a case the work would have got lost among other policy recommendation papers and reports, which would have had limited impact on transition process in Bulgaria. The author, instead, chose the academic format in order to avoid transient effect of the study. Her concerns were to make a work that would contribute to the elaboration of a "transformation theory", which explains the chosen level of complexity.

Such a complex study, trying to cover the main aspects of the transition at the country level, is quite rare at present. Not all the transition countries enjoy it.

The author chose an ambitious task, which she successfully accomplished. Although she points to the geographical nature of her analysis, I would recommend the book not just for geographers, but for economists, policy analysts and for other scholars concerned about transition processes and the Eastern European geographical space. Moreover, the book structure and methodology developed in it would be useful as a template in designing studies on other transition economies as well.

Reference

KORNAI, J. (2008) *What does "change of system" mean?,* Economic studies, 1, pp. 3-29 (in Bulgarian).

Post-Kyoto climate governance: Confronting the politics of scale, ideology, and knowledge

Asim Zia, London and New York: Routledge, 2013, XX+204 p.
ISBN 978-0-415-60125-2 (hbk)

Reviewed by IGOR SÎRODOEV, Academy of Sciences of Moldova, Republic of Moldova

Numerous changes in global and regional climates have been observed, documented and studied from the viewpoints of various sciences and at different scales (IPCC, 2007). On the one hand, changes in global, and, especially, regional, climate represent the triggering factor of alterations in ecosystems and in the environment of those regions, affecting people's welfare as well. On the other hand, changes of regional economic relationships, economic growth or decay, can diminish or accentuate negative impact on the environment and quality of life. Thus, it might be difficult to find the determinant factor for the changes at the regional level in certain economic contexts. Here, multidisciplinary and complex approaches would give better results.

At a first glance, the book by Asim Zia appears to be quite far from regional analysis: its title, "Post-Kyoto climate governance", suggests that in the book, some approaches for developing the climate governance regime after the end of the first commitment period of the Kyoto Protocol in 2012 will be presented. In addition to this obvious theme, the book "takes a trans-disciplinary perspective to identify the causes of failure in developing of (current – I.S.) international climate policy regime". However, after a more careful examination of the book, an aspect catches attention of a regional analyst/planner. It is related to the theoretical framework of this policy-analysis study. The most characteristic climate governance issues were passed through a double sieve of the critical analysis: three theoretical perspectives ("rational", "constructivist", and "complexity") and three "critical policy analytical lenses" (scale, ideology, and knowledge). Thus, the scale "lens" is related to temporal and spatial discounting as well as to synergies and trade-offs in complex systems; the ideology "lens" focuses on the risk, its uncertainty and its perception in complex societies; the knowledge "lens" deals with market approaches to climate governance (greenhouse gases emission entitlements, accountability etc.). The "complexity" perspective, which suggests that not just the atmosphere must be taken into consideration in climate change governance, opens a new view on the trans-scale perspective of the climate change governance of territorial systems at various levels, from local to global.

In his discourse, the author adopts the position of those researchers ("constructivists, social psychologists and critical theorists/political ecologists", in his terminology) who do not consider Kyoto Protocol's legacy "as very useful in terms of mitigating anthropogenic climate change". Actually, the author argues that Bretton-Woods institutions (United Nations, the World Bank etc.) do not constitute a system that would be promoting harmonious and unidirectional environmental policy; that these institutions are not able to cope with current environmental challenges (global climate change, global food insecurity, and global biodiversity loss). These institutions, being designed with the specific purpose of stabilization of the post-WWII world, fail when trying to cope with current environmental challenges: "WTO is promoting deforestation, while UN-REDD and UNEP programs are promoting forest conservation; where the World Bank is promoting unfettered economic development, while the International Union for Conservation of Nature (IUCN) is promoting biodiversity conservation" (p. 14). The book strongly criticizes their current policies, which seem to have totally opposite targets.

The author advocates the importance of complexity theorists, which "can bring new insights in informing this global policy discourse" (p. 15). The author argues that "a complex systems based adaptive, decentralized and democratically anchored governance of coupled human and natural systems could be used as guideposts to adequately cope with global environmental and social crises" (p. 162). According to the author's opinion, the out-dated Bretton-Woods institutions should be replaced by the new ones, based on the complex systems approach. The latter would facilitate shifting "from expert-based international organizations to democratically-anchored governance networks" (p. 11). Within such networks regional entities would enjoy more power in climate governance debates and decision-making. Thus, instead of more or less directive approach, currently promoted by those Bretton Woods institutions, whose activity affects global challenges, the climate policy would result from the democratic dialog within the networks specifically designed for governing social ecological systems. In such a way, "human civilization is called upon... not to control, but to enable and adapt, and partially shape what will emerge" (p. 9). Unlike control, which implies certain robustness of its structures, adaptation and shaping are highly flexible. The latter allows regional systems "transition(ing) in and out of multiple stable states, or even exist(ing) far from equilibrium" (p. 9).

This approach is particularly attractive for regional analysts and urban planners. In such a way, they would have more meaningful contribution to climate governance, while climate policy would pay more attention to regional peculiarities. A critical mass of regional opinions would be able to significantly shape the global climate governance discourse. I believe this book would serve as excellent starting point for involving territorial systems approach into climate policy debates, and, ultimately, into climate governance architecture of the post-Kyoto era.

Reference

IPCC (2007), *Climate Change 2007: Synthesis report*, Geneva, IPCC, 104 p.

Aims and scopes

Analysis of the urban and regional condition needs to be interdisciplinary. In reality, urban researchers usually tend to belong to a discipline reflecting their training whether as sociologists, geographers, planners or any number of subjects concerned with the study of space and place. Our training very often endorses an appreciation of how other disciplines explore the city. For the journal the acknowledgement of the many disciplines that concerned with understanding cities and regions will be indicated by the different disciplinary back-grounds reflected in the papers published. Articles will be published by geographers, sociologists, planners, economists, political scientists, to mention just few of the disciplines involved in urban and regional study.

The Journal of Urban and Regional Analysis plans to be a key outlet publishing topical articles dealing with cities and regions. In later issues we plan to include sections devoted to notes and comments as well as a policy section outlining and discussing state and non-state initiatives aimed at improving cities and regions, together with the problems confronted by their implementation.

Instructions to Authors

1. The Journal of Urban and Regional Analysis seeks to redefine and revigorate the links between geography, sociology, planning, economy, political science. It aims to publish original academic research, critical studies and discussions of the highest scholar standard in the field of urban and regional development. Submitted papers will be evaluated on the basis of their creativity, academic quality and contributions to advancing understanding of the complex problems related to urban and regional development.

2. Submitted manuscripts must be original, unpublished contributions. They must not be submitted or accepted by any other publications. All articles submitted to the Journal will be available online, free of charge.

3. One electronic copy of the manuscript (sent by email in PDF format) should be submitted to either of the two Editors listed below.

Ioan IANOŞ
University of Bucharest - Interdisciplinary Centre for Advanced Research on Territorial Dynamics, 030018, Bucharest, Romania 4-12, Regina Elisabeta Blv.
E-mail: office@cicadit.ro

Ronan PADDISON
University of Glasgow - Department of Geographical and Earth Sciences East Quadragle University Avenue, Glasgow G12 8QQ UK
E-mail: Ronan.Paddison @ges.gla.ac.uk

4. Layout: Manuscripts should be written in English and contain no more than 8000 words. Page setup: A4 size, 3 cm. all margins; title: Arial Bold, 12 pts, all caps, centered.; 2 empty rows (same font); name of authors using Arial, 10 pts.: first name italic, last name upper-case, centered. Affiliation follows below, centered; 2 empty rows (same Font). The abstract: start with the word "Abstract", followed by the text, not to exceed 150 words. Use Arial, 8 pts., justified alignment, indent 2 cm. left and right; 1 empty row, same font. Three or four keywords should start after the word "keywords", written using Arial, 8 pts., justified alignment, indent 2 cm. to the left. Keywords should be written using Arial Italic, 8 pts.; 2 empty rows, same font. The text uses Arial, 9 pts., Justify alignment. Headings use Arial Bold, 9 pts., centered. Research articles should use the following headings: Introduction, Materials and Methods, Results and Discussion, Conclusions, References. The text of tables uses Arial, 9 pts. Captions and tiles of tables are centered and use Arial Bold, 9 pts. Tables and figures should be centered and numbered consecutively throughout the manuscript and referred in the text using Arab numbering. Captions should use the word table/figure with italic characters followed by the title with bold font. Citations in the text should use the Harvard System of short references, for example, (Geyer 2002) followed by a, b,... when two or more references to works by one author are given for the same year, e.g. (Geyer 2002a, 2002b). Page numbers should be indicated for quotations. At the end of the article, a full listing of references in alphabetical order should be provided in the following style; use Arial, 9 pts, hang at 1cm:

GIDDENS, A. (1990), *The Consequences of Modernity*, Polity Press, Cambridge.

MARSHAL, R. (1995), *The global job crisis,* Foreign Policy, 100, pp. 50-68.

*** (1938-1941), *General Romanian Population and Settlements Census on December the 29th 1930*, I-X, ICS, Bucharest.

Images should be submitted in their final form, both as good quality hard copy and electronically.
Authors not proficient in English should have their manuscripts checked before submission by a competent English speaker. To edit your manuscript, use the template available at www.jurareview.ro.

5. Paper submissions must be printed on one side of A4 or US Letter-sized paper, double spaced (including footnotes and references) with a 1.5 inches margin and numbered pages. Submissions will not be normally returned to authors. Avoid excessive use of footnotes. Tables and figures should be attached on separate pages at the end of the manuscript and their approximate position indicated in the text .

6. Final versions of papers accepted for publishing should be submitted electronically in a MS Word compatible format suitable for editing.

7. The Journal of Urban and Regional Analysis also publishes reviews of selected books in the field of urban and regional development. Books should be sent for potential review by JURA to the University of Bucharest - Interdisciplinary Centre for Advanced Research on Territorial Dynamics, 030018, Bucharest, Romania, 4-12, Regina Elisabeta Blv .

Open-access journal

ISSN 2067-4082

www.editurauniversitara.ro