Dr. Flora Mª Diaz-Pèrez, Dr Victoria Jimènez-González, Regional Science Inquiry Journal, I, 1(2009) pp.11-19

SPATIAL DISTRIBUTION OF EMPLOYMENT OPPORTUNITIES IN THE CITY OF SANTA CRUZ DE TENERIFE

Dr. Flora Mª Díaz-Pérez
Dr. Victoria Jiménez-González
University of La Laguna, Spain
E-mail: fdiazp@ull.es

Abstract:
The analysis of spatial mismatches in access to employment remains a very important area of labour market literature. A particular case is that of the mismatches in urban labour markets, which can result in substantial differences in the employment opportunities available in city centres and suburbs. This study examines the spatial mismatches presented in the labour market of Santa Cruz de Tenerife. To that end, the results of a survey taken in 2003-2004 of a sample of 2000 city residents were reviewed. Results confirm the importance of transport policy for city residents; they suggest that public transport linking the different districts to the city centre should be reviewed.

Key Words: spatial mismatches hypothesis, urban labour market, employment opportunities

1. Introduction:

The analysis of spatial mismatches in access to employment remains a very important area of labour market literature. A particular case is that of the mismatches in urban labour markets, which can result in substantial differences in the employment opportunities available in city centres and suburbs. Similarly, neighbourhood behaviour patterns and differences in education levels compound the already poor employment conditions of least-favoured sectors, who live in very specific locations in most cities.

This study examines the spatial mismatches presented in the labour market of Santa Cruz de Tenerife. To that end, the results of a survey taken in 2003-2004 of a sample of 2000 city residents were reviewed. The survey, funded by Santa Cruz de Tenerife City Council, was used to obtain a sub-sample of 727 residents of the city meeting the characteristics required for the present work.

2. Background

Two approaches can be identified in terms of explaining the effect of place of residence on how individuals live within a given city: the spatial mismatch hypothesis and 'neighbourhood effect' literature. The first of the two theoretical approaches (spatial mismatch hypothesis) centres on the relationship between urban location and employment opportunities. The hypothesis emerged some people forty years ago thanks to the work by Kain (1968). Other leading authors include Gorden, Kumar and Richardson (1989), Jencks and Mayer (1990), Blackely (1990), Holzer (1991), Holzer and Vroman (1992) and Ihlanfeldt (1994).

Kain's theories gave rise to the emergence of a current of later studies, including the works by Wilson (1987), Kasarda (1989), Peterson and Vroman (1992), and Packer and Writ (1992). For this group of authors, interest should focus not so much on the spatial mismatch but on differences in education. The empirical studies they present show that, while employment has grown in areas inhabited by the least-favoured and less-educated sectors of the labour market, the focus has been on jobs in the upper segment of the market and the more disadvantaged levels have therefore been unable to access the new vacancies. This circumstance led the above-mentioned second generation of authors to suggest that, if the aim is to equate the

living conditions of persons who reside in areas offering different employment opportunities, the education mismatch needs to be addressed before the spatial one.

It is possible that this approach, which essentially views education mismatches as the fundamental cause, has disregarded the second of the two theories - neighbourhood effect -, the hypothesis representing the other major thrust of research in the study of the consequences of residential location. Under this latter approach, the characteristics of the neighbourhood are linked to individual behaviour and to access to employment opportunities. One therefore needs to examine the cultural models generated by different neighbourhoods and their effects on attitudes and behaviours concerning the labour market. Researchers have tended to focus primarily on the neighbourhood effects on children and teenagers. Studies conducted include those by Hogan and Kitagana (1985), Crane (1991), Coulton and Pandley (1992) and Coulton et al (1995).

Studies of labour market spatial mismatches are particularly important in the case of cities. The metropolitan labour market is spatially segmented due to the 'travel to work' structure, which penalises the most disadvantaged groups, and due also to housing market segregation, information flow asymmetry, and discrimination by employers too (Zhang and Bingham, 2000, p.392).

In the present work we focus on the spatial mismatch hypothesis mentioned above. The approach taken is in line with the work by Zhang (1998), MacDonald (1999) and Blumenberg (2004), among others, who pay particular attention to commuting by workers from home to work. According to Zhang (1998), transport costs - which cover both indirect costs (fuel and car depreciation) and fares paid by commuters - play a fundamental role in the segmentation of the local labour market, particularly for low-earners, for whom commuting represents a considerable portion of their wages. MacDonald (1999), for example, studied the link between journeys made by women and their participation in the labour market, and found that shorter journeys are explained in terms of low salaries.

The new aspect introduced in this study is the way in which travel to work is measured. In our case, this is done by taking the average travel time needed to reach the areas where jobs are concentrated. In addition, we consider as study variables age, level of education, gender, and others such as home ownership, the number of cars owned by the family unit and the length of time lived in the city.

In line with the approach followed here, Blumenberg (2004) recommends economic policy measures to better connect residents' wellbeing to job opportunities. Kraus (2004, p. 49), referring to the importance of economic policy decisions in the concentration of poverty in the United States, states that 'on several political decisions concerning housing, redevelopment and education, local governments have frequently assumed the desire of the majority, often that of the white majority which has supported policies that have segregated and on occasions isolated the Afro-American community'.

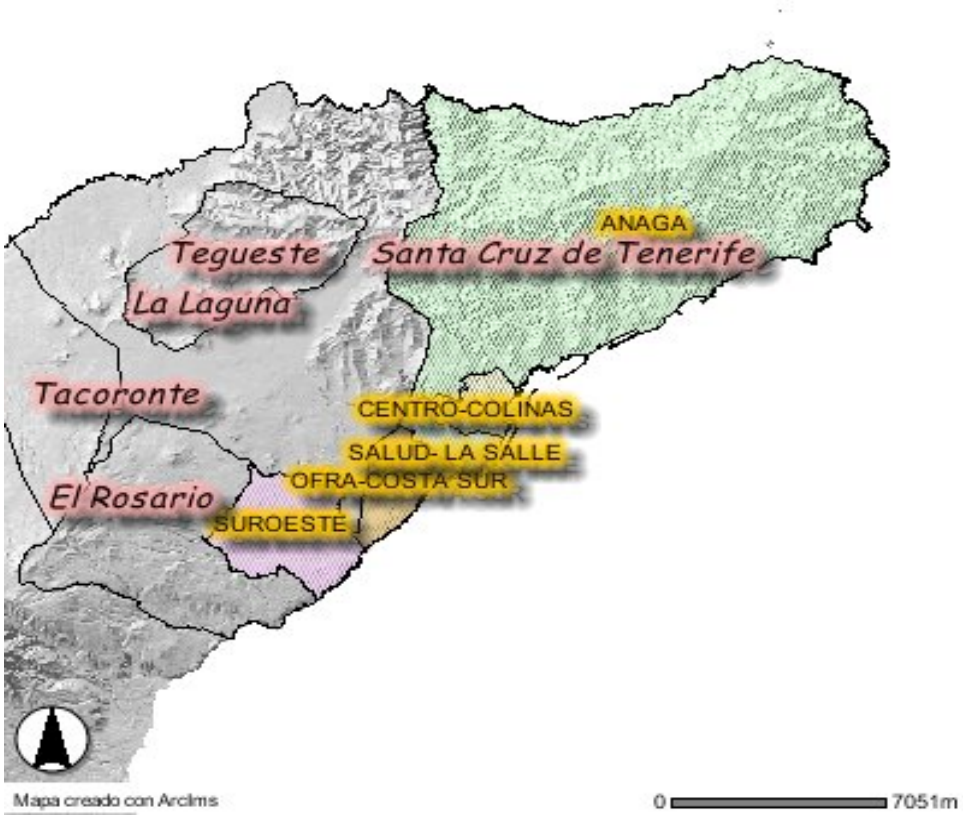
Our aim in this work is to offer some suggestions to guide the action of the competent authorities when seeking to address spatial mismatches in the labour market.

3. Empirical Analysis

3.1. *Introduction*

Santa Cruz de Tenerife, the capital city of the island of Tenerife (Canary Islands), has a population of 223,347 (2005) and covers an area of approximately 150 km^2, with a population density of 1483 inhabitants per km^2. The city is divided administratively into five districts, as shown in the map below.

Map of Santa Cruz de Tenerife



The characteristics of the five districts are in Table 3.1

Table 3.1

ZONE	Name	Km^2	Population
A	Anaga	119.32	14,056
B	Centro-Colinas	4.41	53,304
C	Salud-La Salle	4.14	67,821
D	Ofra-Costa Sur	7.53	49,122
E	Suroeste	14.58	39,044

Each district is very different to the others and major differences also exist between the centre and the suburbs in terms of the labour market structure.

Most of the studies on spatial mismatch in labour markets cited in the preceding section on theoretical considerations are based on the hypothesis that the least-favoured segments of the labour market reside in city centres, whereas those who benefit from the best conditions live in the suburbs.

In the case of Santa Cruz de Tenerife, however, as a rule it is the city-centre residents who enjoy better employment access conditions. A similar situation is reported in other studies, such as that by Immergluck (1998), which confirms that in areas populated mainly by coloured people the suburbs offer less access to employment and receive less investment.

However, it is worth clarifying that Immergluck's works seek to reinforce the hypothesis of education mismatches, as mentioned above in the section on background, ahead of spatial mismatches. In the particular case of Santa Cruz de Tenerife, other circumstances are present which account for the existing situation.

In Santa Cruz de Tenerife the reasons are more to do with the city's specialist production niche: basic service activities (social, administrative, trade, financial and consultancy), i.e. firms specialising in consumer-oriented activities, as opposed to production-oriented, and which thus tend to be located close to their clients and users, given that their market area tends to be highly localised.

3.2 Data

The data used correspond to the five districts of the city of Santa Cruz de Tenerife and cover the following variables:

Employment status (unemployed - employed)
Gender (male - female)
Age (under 24 - 24 and above
Education (primary or below - secondary or above)
Years resident in the city (less than 5 years - 5 years and above)
Home (not owned - owned)
Number of cars /members in family unit
Average journey time to city centre

All are dichotomous variables, except for the last two, which are numerical.

The explanatory variables considered initially in the model are gender, age, the number of years resident in the city, education, home ownership, number of cars/members of the family unit, and average journey time to the city centre.

The reasons for the choice of these explanatory variables can be summarised as follows.

1) Age, gender and education are decisive variables for studying the labour market and are generally taken into consideration when testing the spatial mismatch hypothesis.

2) Journey time from home to the city centre, where the bulk of jobs tend to be located, and the number of cars owned by the family unit also merit special attention. Other studies that set out to test the spatial mismatch hypothesis in cities use the number of kilometres travelled as a variable. The distance is usually measured in terms of the train journey from the different districts to the areas where the majority of jobs are concentrated. Given the geographical characteristics of the city studied here, we have opted to use travel-time as opposed to distance as the variable. Santa Cruz de Tenerife has a number of mountainous districts (Anaga, highest point 750m) which are connected to the city centre by mountain roads. However, it also has low-lying districts which are linked to the centre by motorway. Consequently, the same distance can take much longer in the case of the former.

3) By taking into account the number of years a person has lived in the city we hope to indirectly gauge the influence, which immigrant status may have, on whether the person is employed or unemployed. Similarly, we assume that the unemployed are less likely to be home-owners.

3.3. Methodology

Our aim is to study the possible relationship between the employment status of residents of Santa Cruz de Tenerife and the other variables considered. For this purpose we used a sample of

727 individuals, which was obtained from the study carried out by Díaz, F., Bethencourt M. and others (2004).

The two possible techniques that could be used are

✓ A logit model, in which employment status would be the dependent variable and the others would be factors, except for the last two, which would be co-variables given their numerical nature.

✓ A discriminant analysis, in which employment status is the classifying variable and the remaining variables are the independent variables of the model, depending on their classification.

We have opted for a Discriminant Analysis given that:

❖ It analyses the sample of individuals one by one and decides if, according to the independent variables, they have the characteristics of an unemployed or employed person.

❖ It provides a model which can be used to decide in which group an individual with given characteristics is more likely to be found.

❖ It indicates which variables best discriminate between the two groups considered.

3.4. Results Analysis

The main results obtained from the discriminant analysis using the SPSS package are given below. When tests of the equality of the group means are performed for the unemployed and employed groups, significant differences are found at significance levels below 2% for the following variables:

Journey time to city centre	Gender
Age	No. of cars/members of the family unit

Table 3.2 sets out the results of the tests. The last column indicates the area of probability to the right of the critical test point for each variable. Bold print denotes cases where the hypothesis of equality between the two groups (unemployed and employed) should be rejected.

Table 3.2

Variables	Tests of equality of group means				
	Wilks Lambda	F	df1	df2	Sig.
Journey time to city centre	0.991	6.379	1	725	0.012
Gender	0.986	10.348	1	725	0.001
Age	0.943	44.122	1	725	0.000
Education	0.996	2.989	1	725	0.084
No. cars /members of family unit	0.976	18.114	1	725	0.000
Years resident	0.999	1.056	1	725	0.304
Own home	0.999	0.997	1	725	0.318

Logically, these are the variables that best discriminate between the two groups considered, as shown in table 3.3:

Table 3.3

Variables in the analysis	Tolerance	F to remove	Min. D squared	Between groups
Age	0.986	42.669	0.252	Unemployed and

				employed
Gender	0.976	14.648	0.466	Unemployed and employed
No. of cars /no. in family	0.986	11.122	0.494	Unemployed and employed
Journey time to city centre	0.977	5.103	0.543	Unemployed and employed

The above table indicates the variables that maximise the Mahalanobis distance between the closest groups, provided they meet the following restrictions:

The minimum partial F to enter is 3.84	The maximum partial F to remove is 2.71

The other variables do not sufficiently discriminate between the unemployed and employed groups and they are therefore excluded from the analysis:

Education	Years of residence	Own home

We can conclude that, using the variables included in the analysis (see Table 3.3), there are significant differences between the unemployed and employed groups. This is confirmed by Table 3.4, which gives the results of an ANOVA comparing the equality of means for the two groups.

Table 3.4

Comparisons of groups by pairs (*)			
Employment status		Unemployed	Employed
Unemployed	F		19.631
	Sig.		0.000
Employed	F	19.631	
	Sig.	0.000	

(*) 4.722 degrees of freedom

The model obtained using the Discriminant Analysis is the discriminatory canonical function:

$$ES = -2{,}029 - 0{,}033T - 0{,}92G + 1{,}95A + 1{,}018C \quad \text{(equation 3.1)}$$

where each of the parameters corresponds to the variables included in the analysis, given that they are the ones that best discriminate between the unemployed and employed groups.

Parameters	Variable
ES	Employment status
T	Journey time to city centre
G	Gender
A	Age
C	No. cars /members of family unit

If the values of this variable are replaced in the case of a specific individual, the result is likely to be lower if the person is unemployed given that the centroid for the unemployed lies on the negative side, whereas the centroid for the employed is positive (Table 3.5).

Table 3.5

Group centroid functions	
Status: unemployed or employed	Function 1
Unemployed	-0.576
Employed	0.188

Note that the T (journey time to city centre) and G (gender) variables have negative coefficients and hence when the values for the variables of a specific individual are substituted in equation 2.1., the higher these are, the lower the value of the dependent variable will be. In other words, if the journey time to the city centre is longer and the individual is female (G=2), the likelihood that the individual is unemployed is greater.

The classification can also be performed using Fisher linear discriminant functions, which are as follows in our case:

$$\begin{aligned} ESU &= -17{,}9133 - 0{,}0338T - 6{,}279G + 10{,}108A + 2{,}274C \\ ESE &= -18{,}197 - 0{,}313T - 5{,}575G + 11{,}598A + 3{,}052C \end{aligned} \quad \text{(equation 3.2)}$$

If the values of the independent variables included in the model are substituted for a specific individual, these two equations will enable us to ascertain whether the person is more likely to belong to the unemployed group or to the employed group. The individual will be included in the group for which the equation result is higher.

Table 3.6

Result of the classification (*)	Status	Predicted group membership		Total
		Unemployed	Employed	
Count	Unemployed	38	141	179
	Employed	26	522	548
%	Unemployed	21.23	78.77	100
	Employed	4.74	95.26	100

(*) 77.0% of the original grouped cases classified correctly.

Using the model obtained, the results of the classification of the individuals included in the analysis show that 77% are correctly classified in their respective groups (unemployed and employed) (Table 3.6). In other words, their characteristics in terms of the best discriminating variables match their employment status.

4. Conclusions

Our study's results allow us to draw the following conclusions with regard to the validity of the spatial mismatch hypothesis in the case of Santa Cruz de Tenerife.

1) The possibility of being unemployed increases with longer journey times from home to the city centre, where the bulk of jobs are usually found. It also increases where the family unit has fewer cars.

2) Adscriptive characteristics, particularly age and gender, are also determinant depending on the model. The likelihood of being unemployed is higher in the case of females and individuals aged under 24. These results are in line with the majority of studies that test the spatial mismatch hypothesis, as described above in the background section.
3) Education did not prove significant, although the statistics indicate it was very close to significance level.
4) Home ownership and the number of years of residence in the city did not prove significant in the analysis. Consequently, the results obtained mean that, for this particular case study, we cannot consider the potential relationship which might exist between these variables and labour market status.

By way of summary, we can conclude that, in the particular case of Santa Cruz de Tenerife, rather than focus on education policies to improve the situation of the unemployed, the emphasis should be placed on transport policy for city residents. Public transport linking the different districts to the city centre should be reviewed, specifically timetables, frequencies and direct costs, which should be adapted to the requirements of the labour market. These results contradict to some extent the approach followed within the spatial mismatch hypothesis (Wilson, 1987; Kasarda, 1989; Peterson and Vroman, 1992 and Packer and Writ, 1992), which attributes greater importance to education policy than spatial policy as a means of addressing poorer living conditions in the most disadvantaged areas of cities.

5. References

Blackely, P.R.(1990): "Spatial mismatch in urban labor markets: evidence from large U.S. metropolitan areas". Social Science Quarterly 71(1): 39-52.

Blumenberg, Evelyn and Michael Manville (2004): "Beyond the Spatial Mismatch: Welfare Recipients and Transportation policy". Journal of Planning Literature, 19(2): 182-205.

Coulton, Claudia J., and Shanta Pandey (1992): "Geographic concentration of poverty and risk to children in urban neighbourhoods. American Behavioral Scientsts 35:238-57.

Coulton, Claudia J., JiL E. Korbin, Marilyn Su, and Julian Chow (1995): "Community level factors and child maltreatment rates. Child Development, 66:1262-76

Crane, Jonathan (1991): "Effects of neighbourhoods on dropping out of school and teenage child bearig". En The urban underclass, editado por Christopher Jencks and Paul E. Peterson, p. 299-320. Broookings Institutions, Washington D.C.

Díaz, F., Bethencourt M. y otros (2004). Análisis de la oferta social y cultural del municipio de Santa Cruz de Tenerife. Ayuntamiento de Santa Cruz de Tenerife y Fundación Empresa-Universidad de La Laguna.

Díaz, F., Bethencourt M. y otros (2004). Demanda y valoración de la oferta deportiva del municipio de Santa Cruz de Tenerife. Ayuntamiento de Santa Cruz de Tenerife y Fundación Empresa-Universidad de La Laguna.

Gorden, P., A. Kumer, and H.W. Richardson (1989): "The spatial mismatch hypthesis: some new evidence". Urban Studies 26: 315-26.

Hogan, Dennis and Evelyn Kitagana (1985): "The impact of social status, family structure, and neighborhood on the fertility of black adolescents. American Journal of Sociology, 90:825-55.

Holzer, H.J. (1991): "The spatial mismatch hypothesis: what has the evidence shown?". Urban Studies 28: 105-22.

Holzer, H.J. and W. Vroman (1992): "Mismatches and the urban labor market". En Urban Labor Markets and job opportunity, editado por G.E. Peterson and W. Vroman, p.81-104. Washington D.C.: Urban Institute.

Ihlanfeldt, K.R. (1994): "The spatial mismatch between jobs and residencial locations wirhin urban areas". Cityscape, 1(1): 219-24.
Immergluck, D. (1998): "Job Proximity and Urban Employment Problem: Do Suitable Nearby Jobs Improve Neighbourhood Employment Rates?". Urban Studies, 35(1): 7-23.

Jencks, C. and S.E. Mayer (1990): "Residential segregation, job proximity and black job opportunities". En Inner city-poverty in the United States, editado por L.E. Lynn Jr. and M.G.H. McGreary, p.187-222. Washingon, D.C.: National Academy Press.

Kain, John F. (1968): "Housing segregation, Negro employment, and metropolitan descentralizacion". Quarterly Journal of Economics, 82:175-97.

Kasarda, John (1989): "Urban industrial transition and the underclass". Annals of American Academy of Political and Social Sciencies, 501:26-47.

MacDonald, Heather I (1999): "Women´s Employment and Commuting: Explaining the links". Journal of Planning Literature, 13(3):267-83.

Packer, A.H. and J.G. Writ (1992): "Changing skills in the US work force: Trends of supply and demand. En Urban Labor Markets and job opportunity, editado por G.E. Peterson and W. Vroman, p.31-63. Washington D.C.: Urban Institute.

Peterson, G.E. and W. Vroman (1992): "Urban labor markets and economics opportunities". En Urban labor markets and jobs opportunity, editado por G.E. Peterson and W. Vroman, p.1-29. Washington D.C.: Urban Institute.

Wilson, William J. (1987): "The truly disadvantaged". University of Chicago Press, Chicago.

Zhang, Z. and Bigham, R.D. (2000): "Metropolitan employment growth and neighbourhood job access in sp atial and skills perspectives. Empirical evidence from seven Ohio Metropolitan Regions". Urban Affairs Review 35(3): 390-421.

Zhang, Z. C. (1998): "Indirect tests of the spatial mismatch hypothesis in the Cleveland PMSA: A labor market perspective. Urban Affairs Review 33(5): 712-23.