# 7 *Does city structure cause unemployment? The case of Cape Town*

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## *Introduction*

In June 1998, the South African newspaper *The Star* told the story of a 46-year-old single mother who lives in the suburbs of Cape Town and commutes every day to a job located in a central part of the city. Up before dawn, she has a one-kilometre walk to a taxi rank and often waits an hour before being able to board her only transport to work, at about 6 a.m. If she could afford it, she would buy a car, but half her wages are spent on transport already and the rest goes towards school fees for her daughters, who attend an inner-city school.[1] Such stories of long and costly commuting trips are not uncommon for South African township dwellers, and illustrate two of the major problems faced by today's South African cities: *urban sprawl* and *a high level of segregation of population groups*. This situation has been inherited in part from the former apartheid policy which allowed only whites to live in the city centre where most of the jobs were located. Hence, urban non-whites were forced to reside in peripheral areas, far away from jobs and organised in racially segregated townships separated from each other by unoccupied buffer zones.[2] Today, even though land-use restrictions have been abolished, urban fragmentation remains the norm (see Brueckner 1996 and Selod and Zenou 2001a for urban models comparing apartheid and post-apartheid uses of urban land).

In this context, it is not difficult to imagine that a stratified city structure may strongly affect local labour-market outcomes, and particularly exacerbate unemployment and poverty. Indeed, an abundant literature in both sociology and urban economics suggests that the spatial organisation of cities can drive unemployment because of (i) *the harmful effect of residential segregation* along ethnic or socio-economic lines, or (ii) *the negative impact of the disconnection between places of work and places of residence* (the so-called *spatial mismatch hypothesis* initiated by Kain 1968; see Gobillon, Selod and Zenou 2005 for a theoretical survey of the literature, and Ihlanfeldt and Sjoquist 1998 for an empirical review). These theories linking labour-market outcomes to the spatial organisation of cities have been tested in metropolitan areas (see O'Regan and Quigley 1996; Immergluck 1998) in the USA, but the issue has seldom been investigated in cities in the developing world, although city fragmentation is a major issue in many developing countries. The objective of the present work is to investigate how city structure can affect employment prospects

in the particular case of Cape Town. The first section of the chapter presents a brief synthesis of the economic literature that links the formation of unemployment to city structure. The next section presents some relevant descriptive statistics on Cape Town, related to its population and its economic structure. The third section presents our methodological approach and carries out the empirical analysis.

## *Urban unemployment and city structure: A brief review of the literature*

An abundant literature in sociology and urban economics suggests that the spatial organisation of cities can exacerbate unemployment and deteriorate the income of disadvantaged communities. In this perspective, labour market outcomes should depend on individual characteristics (age, education, ethnicity…) but also on location within the city. The present section surveys the two major explanations put forward by economists that underpin this theory. The first explanation stresses the role played by the physical distance from job opportunities, whereas the second one underlines the harmful effects of residential segregation.

### *The physical disconnection between jobs and residential locations*

The first reason why city structure might influence labour market outcomes is that the physical disconnection between places of work and places of residence (i.e. *spatial mismatch*) can be a source of long journeys and expensive commuting costs, which in turn hinder the mobility of workers. Moreover, the costs associated with the physical disconnection from jobs may be further accentuated by congestion and, for those who do not own a car, by the poor quality of public transport systems (as a result of incomplete network coverage, long waits at connection nodes, or the lack of coordination between transportation modes). Some workers – notably unskilled workers who are likely to hold part-time jobs or start working very early in the morning or late at night – may be confronted with low public transport frequencies, if not with the closing of the network at the times when they need it. In this context, unemployed workers residing in neighbourhoods disconnected from job opportunities face temporal and monetary commuting costs that are often very high in comparison with the wages they are offered. This can lead to very low net wages, and deter workers from accepting any job at all. In this respect, Brueckner and Martin (1997) and Brueckner and Zenou (2003) propose urban models in which commuting costs are indeed the main source of both low wages and urban unemployment.

Distance from job opportunities may also discourage job search (when it is too costly) or even deteriorate its efficiency. In this respect, it has been shown that the quantity and quality of information that workers have about job opportunities within a specific metropolitan area decrease with distance from jobs, which in turn reduces the efficiency of job search (see Rogers 1997; Ihlanfeldt and Sjoquist 1990; Ihlanfeldt 1997). There are several reasons for the fact that information about jobs decreases

with distance. For instance, many employers resort to spatially-limited search modes such as posting 'wanted' signs in shops, or having advertisements published in local newspapers (Turner 1997). Another explanation is that job candidates usually experience difficulties in identifying potential recruiters in distant zones with which they are unfamiliar. In this respect, Davis and Huff (1972) have shown that jobseekers search efficiently only in a restricted perimeter around their place of residence, even if this zone hosts only poor-quality jobs that pay little. These mechanisms are at the core of theoretical models that aim to explain the formation of urban unemployment (see Wasmer and Zenou 2002, who argue that job search efficiency decreases with distance to jobs, or, in a different context, Ortega 2000 who postulates that search costs are higher outside a worker's zone of residence).

*Residential segregation*

Physical disconnection between jobs and residential locations is not the only way in which space can deteriorate the socio-economic opportunities of workers. Researchers also stress the role of socio-economic and often ethnic segregation (see, for example, Cutler and Glaeser 1997; Selod and Zenou 2001b), which may have four main consequences.

Firstly, residential segregation can be a hindrance to human capital acquisition, which may in turn deteriorate the employability of segregated workers, and especially that of young individuals. The links between residential segregation and poor school results are indeed well documented: residential segregation often concentrates low-skill learners in certain schools, and this concentration exerts a negative pressure on the learning process (Benabou 1993). This is because, as shown by the literature on education production functions, the success of a given student largely depends on the socio-economic characteristics of all the other students in the class (Summers and Wolfe 1977; Arnott and Rowse 1987). In other words, in neighbourhoods where low-ability students are concentrated, human capital externalities can further deteriorate school achievements.

A second consequence of residential segregation is that it fuels the emergence of social problems that also deteriorate the employability of workers. In this respect, Crane (1991) develops an *epidemic theory of ghettos* in which the propensity of youngsters to adopt socially deviant behaviour (for instance, dropping out of schools or yielding to criminality) depends on the proportion of same-behavior individuals in the neighbourhood. This contagion is all the more prevalent when the adults in the neighbourhood are themselves unemployed and do not provide role models of social success with which youngsters could identify.

A third consequence of residential segregation is that it can deteriorate social networks in disadvantaged communities. This is a crucial point, since a significant proportion of jobs are usually found through personal contacts (Mortensen and Vishwanath 1994) and since low-skilled workers, young adults, and ethnic

minorities often resort to such informal search methods (Holzer 1987, 1988). In other words, social network quality is a key factor in the job-acquisition process of unskilled workers and ethnic minorities, but since many such individuals reside in disadvantaged neighbourhoods, they usually benefit from social networks of poor quality. In particular, the local unemployment rate in these neighbourhoods is usually higher than average, so that local residents know fewer employed workers who could refer them to their own employer or provide them with professional contacts. In this respect, Reingold (1999) concludes that the poor quality of social networks explains a significant portion of unemployment problems in disadvantaged urban areas in the USA. These issues have recently been the focus of several formalisations: Calvo-Armengól and Zenou (2005) present a non-spatial theoretical model of social network and unemployment formation, while Selod and Zenou (forthcoming) provide an urban model in which residential segregation can exacerbate unemployment through low-quality social networks.

Finally, a fourth mechanism that links bad labour market outcomes to segregation involves the reluctance of employers to hire workers residing in disadvantaged communities. The stigmatisation of these neighbourhoods is at the root of *redlining*, a practice in which employers draw an imaginary red line around a stigmatised neighbourhood and beyond which they discriminate against residents (see Zenou and Boccard 2000 for a formalisation in an urban model).

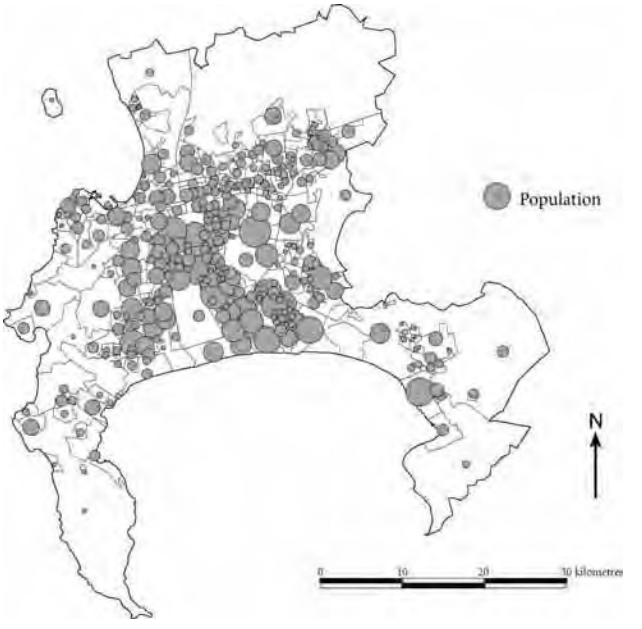
To sum up, several theoretical mechanisms have been proposed to explain how city structure can have harmful effects on the labour market. The remainder of this chapter tries to relate these elements of theory to the particular case of Cape Town.

## *The city of Cape Town: Racial segregation, the disconnection between places of work and places of residence, and labour market outcomes*

In the present section, we provide descriptive statistics for Cape Town, an urban area that covers more than 25 km and encompasses almost 2.7 million inhabitants.[3]

**Figure 7.1** *The Cape Town urban area*


**Figure 7.2** *Residential locations in Cape Town*




Source: Census 1996 (Statistics South Africa)

Figure 7.2 represents the spatial distribution of people within the Cape Town Urban Area (CTUA), each circle being proportional to the local population in the corresponding suburb.

According to the old apartheid classification, the population can be broken down into four population groups (see Table 7.1). Coloureds broadly represent half of the population of Cape Town, whereas whites and Africans each amount to about one-quarter of the population. Asians/Indians form a small minority of 1.4 per cent.

**Table 7.1** *The population of the Cape Metropolitan Area, 1996*

| | Population (in thousands) | Percentage |
|---|---|---|
| Africans | 702 | 26.2 |
| Coloureds | 1 313 | 48.9 |
| Asians/Indians | 37 | 1.4 |
| Whites | 631 | 23.5 |
| **Total** | **2 683** | **100** |

Source: Dorrington 2000

### *Residential segregation*

In this multiracial context, the rule is nevertheless residential segregation. Indeed, under apartheid, only whites were authorised to live close to the city centre. The non-white labour force (i.e. Asians/Indians, coloureds and Africans) were forced to live on the peripheries of cities, sometimes very far away from the city centre. Even though a certain amount of residential desegregation started to occur at the end of the 1980s, these spatial patterns of segregation continued to prevail throughout the 1990s. In other words, a high level of what is now market-driven segregation remains. In Cape Town, for instance, the African–white index of dissimilarity was still above 97 per cent in 1991 (Christopher 1993).[4] We have calculated that in 1996 the African–white index of dissimilarity still exceeded 92 per cent. Table 7.2 presents the dissimilarity indices for the four population groups in Cape Town in 1996. It is striking that the level of residential segregation between any two population groups in 1996 is correlated with the 'racial distance' between these two groups in the old apartheid classification. In particular, whites were less segregated from Indians than from coloureds or Africans. Africans were almost completely segregated from all other groups.

**Table 7.2** *Dissimilarity indices (Cape Town Urban Area, 1996)*

| Africans/ whites | Africans/ Asians (Indians) | Africans/ coloureds | Whites/Asians (Indians) | Whites/ coloureds | Coloureds/ Asians (Indians) |
|---|---|---|---|---|---|
| 92.8% | 94.5% | 93.5% | 76.3% | 86.1% | 63.3% |

Source: Calculated by the authors, using data from Census 1996 (Statistics South Africa).



*The disconnection between places of work and places of residence*

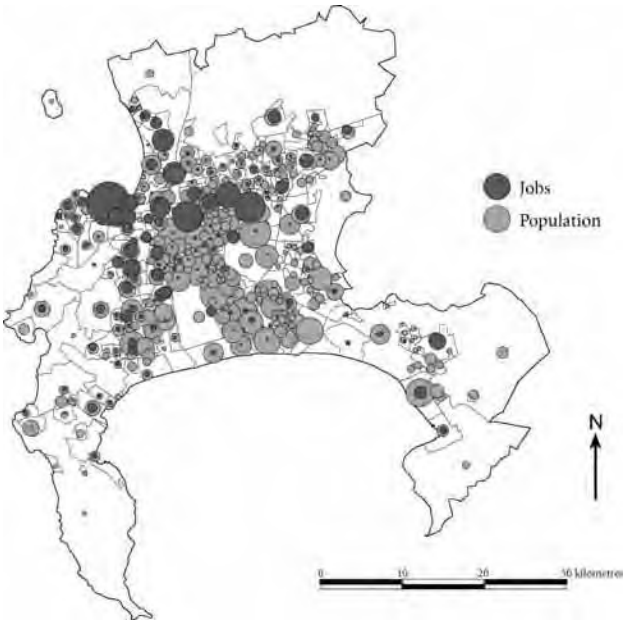
In Cape Town, jobs occupy central locations and most jobs are located around one edge of the city: the central business district and its close surroundings (*Mail & Guardian* 1999). The central areas comprise centres of employment laid out along corridors extending outward from the port and city centre (see Figure 7.3).[5]

**Figure 7.3** *Job locations in Cape Town*


Source: RSC Levy 2000 database

When one compares residential and job locations, it is clear that there exists a major disconnection between places of work and places of residence (see Figure 7.4). This problem has long been identified by Cape Town's urban planners (see, for instance, the Cape Metropolitan Council's *Metropolitan spatial development framework* 1996).

**Figure 7.4** *Population and jobs in Cape Town*



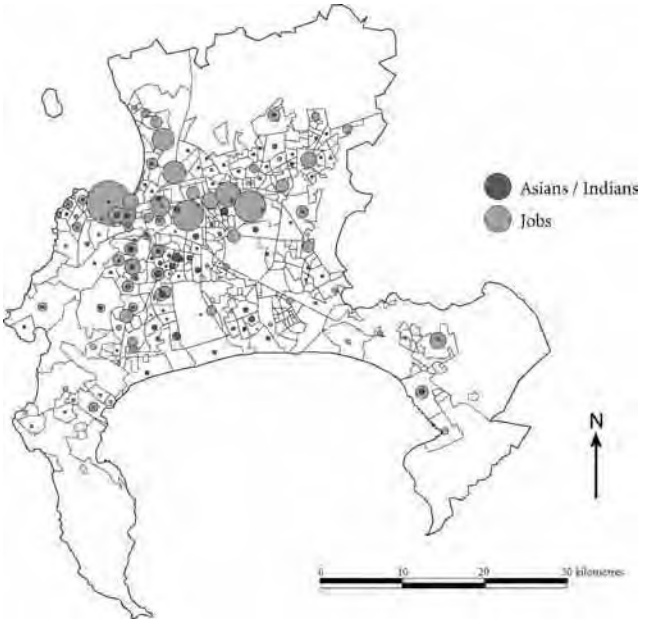

Sources: RSC Levy 2000 database and Census 1996 (Statistics South Africa)

This physical disconnection or *spatial mismatch* does not affect the four population groups equally. In fact whites and Asians/Indians reside relatively close to jobs, whereas coloureds and especially Africans are located at a much greater distance from job locations (see Figures 7.5 to 7.8).

**Figure 7.5** *The location of whites in Cape Town*

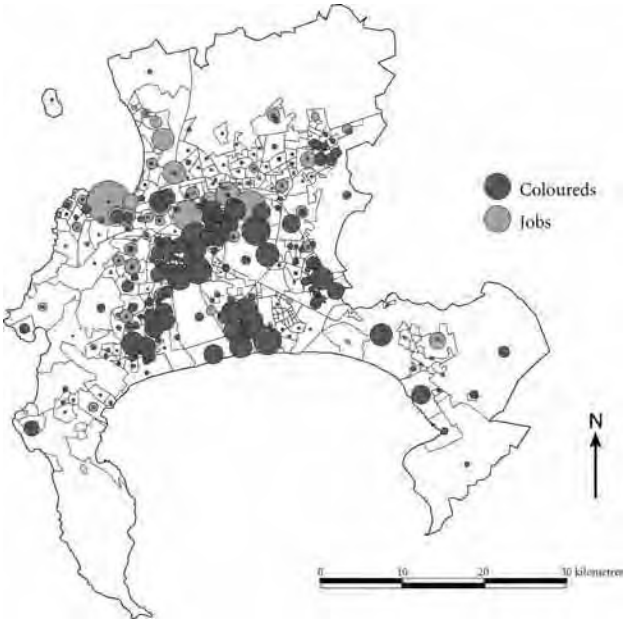

Sources: RSC Levy 2000 database and Census 1996 (Statistics South Africa)

**Figure 7.6** *The location of Asians/Indians in Cape Town*



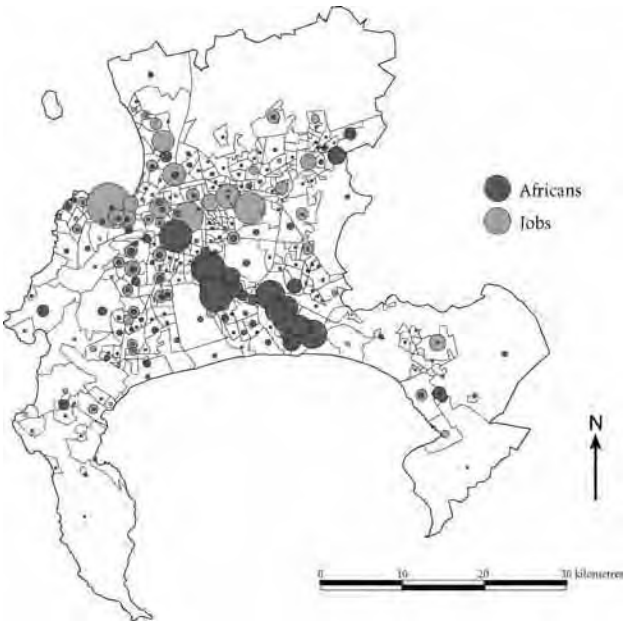

Sources: RSC Levy 2000 database and Census 1996 (Statistics South Africa)

**Figure 7.7** *The location of coloureds in Cape Town*




Sources: RSC Levy 2000 database and Census 1996 (Statistics South Africa)

**Figure 7.8** *The location of Africans in Cape Town*




Sources: RSC Levy 2000 database and Census 1996 (Statistics South Africa)

This situation results in very different degrees of job access across population groups – all the more so since mode choices also differ across population groups. The 1998 study on *Migration and Settlement in the Cape Metropolitan Area* (discussed in detail in the next section of this chapter) provides interesting statistics with respect to commuting that we summarise in Table 7.3. It is striking that whites and Asians/Indians mainly use their cars to go to work, whereas coloureds and Africans mainly resort to public transport.



**Table 7.3** *Transport modes by population group (percentage use) Cape Town, 1998*

| | Walk/ bicycle | Public transport (minibus, train) | Private (car) | Provided by employer | Other | Total |
|---|---|---|---|---|---|---|
| Africans | 12 | 58 | 6 | 13 | 11 | 100 |
| Coloureds | 23 | 39 | 25 | 11 | 2 | 100 |
| Asians/Indians | 19 | 14 | 53 | 12 | 2 | 100 |
| Whites | 16 | 4 | 58 | 16 | 6 | 100 |

Source: Calculated by the authors on a sample of 1 394 workers in the 1998 *Migration and Settlement in the Cape Metropolitan Area* data set.

In this context of different access to jobs and different modes of transport, population groups in Cape Town face very different commuting times and commuting costs (see Table 7.4 below, where it can be seen that Africans have the longest commuting trips and incur the highest costs).

**Table 7.4** *Commuting times and commuting costs by population group (Cape Town, 1998)*

| | Mean commuting time (one-way journey, in minutes) | Median commuting time (one-way journey, in minutes) | Mean commuting cost (return trip, in rands) | Median commuting cost (return trip, in rands) |
|---|---|---|---|---|
| Africans | 39 | 30 | 3.57 | 3 |
| Coloureds | 25 | 20 | 3.89 | 3 |
| Asians/Indians | 19 | 15 | 3.06 | 3 |
| Whites | 23 | 15 | 6.31 | 4 |
| **All groups** | **30** | **25** | **4.03** | **3** |

Source: Calculated by the authors on a sample of 1 394 workers in the 1998 *Migration and Settlement in the Cape Metropolitan Area* data set.

### *Differences in labour market outcomes*

Labour market outcomes vary considerably across population groups in Cape Town. Table 7.5 presents the disparities in terms of unemployment rates and median income. The unemployment rate for Africans in Cape Town is close to 38 per cent, whereas it is only slightly above 4 per cent for whites. The median income of an African worker is less than one-tenth of that of a white worker.

**Table 7.5** *Unemployment and income by population group (Cape Town, 1996)*

| | Africans | Coloureds | Asians/Indians | Whites | Total |
|---|---|---|---|---|---|
| Employed | 182 633 | 427 689 | 13 408 | 245 481 | 869 211 |
| Unemployed, looking for work | 110 791 | 91 483 | 1 590 | 10 522 | 214 386 |
| Unemployment rate | 37.8% | 17.6% | 10.6% | 4.1% | 19.8% |
| Median income (rands per annum) | 4 200 | 15 000 | 24 000 | 48 000 | 15 000 |

Sources: Space-Time Research, and *A Socio-Economic Profile of the Cape Metropolitan Area* by the Cape Metropolitan Council, based on data from Census 1996 (Statistics South Africa).

Of course, these differences in labour market outcomes stem largely from very different levels of education inherited historically (see Selod and Zenou 2001a, 2003 for figures on education imbalances). We will now investigate the extent to which these differences can also be attributed to differences in location, taking into account the role of job accessibility and residential segregation, as the theory suggests.

## *Econometric analysis*

### *Methodological issues*

The objective of our work is to investigate the possible causes of unemployment, with a particular focus on spatial factors. In order to do so, we want to estimate unemployment probabilities at the individual level by taking into account both personal and household characteristics as well as the role played by location characteristics, such as neighbourhood composition or job accessibility.

### *The endogeneity of location choice*

The search for neighbourhood effect is complicated by the fact that individuals choose their locations. Selective migration introduces the possibility that any correlation between locations and employment outcome might not truly represent a 'treatment effect'. The existing literature offers three ways to circumvent the problem of endogenous location choices:

- The first solution is to focus on residential relocation experiments which attempt to randomly assign individuals to locations with different characteristics (Katz, Kling and Liebman 2001).
- The second approach to the problem is to concentrate on the outcomes of children or young adults who presumably do not directly choose their places of residence (O'Regan and Quigley 1998; Case and Katz 1991). However, Vigdor (2002) stresses an important limitation of this line of analysis by showing that selective migration to a city in the parent generation has a significant impact in the child generation.
- Finally, to obtain unbiased estimates of neighbourhood effects, some researchers control for non-random sorting into neighbourhoods by modeling the location choice (Ioannides and Zabel 2002). As Brock and Durlauf (2001) show, identification of neighbourhood effect is enabled by selection bias correction.

These analyses are all very demanding in terms of data set availability, requiring for instance a sample large enough either to select only young labour force participants who live with their parents or to model neighbourhood choice. The 1998 study, *Migration and Settlement in the Cape Metropolitan Area*, that we will use provides information on each person's relationship with the head of the household. However, restricting our sample to children (aged from 15 to 25) who are members of the labour force would reduce the sample to just 255 individuals, which would not allow for any robust econometric estimates. On the other hand, modelling the location choices in the 25 randomly selected areas that were surveyed would raise the same issue of sample size: there are not enough observations in each area to run a multinomial logit. Thus, the econometric analysis presented below does not correct for this endogeneity since, so far, we have not come across a good way of dealing with this issue.[6]

### *The logit model*

We estimate the unemployment probability $P_i$ of an individual $i$ using the following logistic model:

$$Log\left[\frac{P_i}{1-P_i}\right] = \alpha + \beta I_i + \gamma H_i + \delta N_i, \qquad [1]$$

where $I_i$ is a vector of personal characteristics (race group, gender, age, level of education, marital status, head of the household status, birth type of area (rural or urban), date of arrival in the dwelling), $H_i$ is a vector of household characteristics (house ownership, access to electricity), and $N_i$ is a vector of neighbourhood characteristics (median earnings, local employment density, average commuting distance of workers living in the area).[7]

From [1], the individual probability of unemployment $P_i$ is given by:

$$P_i = \frac{e(\alpha + \beta I_i + \gamma H_i + \delta N_i)}{1 + e(\alpha + \beta I_i + \gamma H_i + \delta N_i)} \quad [2]$$

*The determinants of unemployment*

The data and sample

The data we use are derived from three sources. The 1998 study, *Migration and Settlement in the Cape Metropolitan Area* (also referred to as the 'migration study'), carried out jointly by the University of Stellenbosch and the Cape Metropolitan Council (see Cross and Bekker 1999), provides a great deal of information on 990 households (4 299 individuals) living in 25 randomly selected areas (*Enumerator Areas* or EAs[8]) in Cape Town (see Figure 7A2.1 in Appendix 2, which maps the locations of these EAs).[9] Excluding one of the investigated EAs which was not located in our definition of the CTUA, and excluding any household with missing values, we are left with 4 066 individuals belonging to 950 different households residing in 24 different neighbourhoods. The sample we use for the econometric analysis is limited to economically active individuals, between the ages of 15 and 65, for whom all attributes are available, restricting the final sample size to 1 870 individual observations.

The data on the social and economic composition of these EAs come from the 1996 Census. The Regional Service Council (RSC) Levy database provides detailed information on job locations for the year 2000 which enable us to compute the local job density within a defined geographical perimeter.[10]

The results

Table 7.6 displays the results of our logistic regressions, taking into account the different groups of variables. We present four models explaining the probability of unemployment in the CTUA. We first consider individual characteristics as in a standard labour market analysis (model I). Model II introduces some cross-term effects. Then the household's characteristics are added among the independent variables (model III), as well as the neighbourhood features (model IV). Considering household and neighbourhood variables significantly increases the fit of the regression (see the likelihood ratios). Variations in our results are small from one model to the other, so we focus on the model that incorporates the three groups of variables (model IV).

**Table 7.6**. *The influence of individual, household and neighbourhood characteristics on unemployment probabilities*

| | Model I | | Model II | | Model III | | Model IV | |
|---|---|---|---|---|---|---|---|---|
| **Individual variables** | | | | | | | | |
| *Race group* | | | | | | | | |
| White | | <Ref.> | | <Ref.> | | <Ref.> | | <Ref.> |
| African | 0.931*** | (2.537) | 0.966*** | (2.628) | 0.930*** | (2.536) | 0.629** | (1.875) |
| Coloured | –0.276$^{NS}$ | (0.759) | –0.290$^{NS}$ | (0.748) | –0.215$^{NS}$ | (0.806) | –0.455$^{NS}$ | (0.634) |
| Asian/Indian | –0.052$^{NS}$ | (0.949) | –0.037$^{NS}$ | (0.964) | –0.046$^{NS}$ | (0.955) | –0.251$^{NS}$ | (0.778) |
| Male | –0.340*** | (0.712) | 0.030$^{NS}$ | (1.031) | –0.347*** | (0.707) | –0.352*** | (0.703) |
| Age | –0.179*** | (0.836) | –0.182*** | (0.834) | –0.186*** | (0.830) | –0.192*** | (0.825) |
| Age square | 0.002*** | (1.002) | 0.002*** | (1.002) | 0.002*** | (1.002) | 0.002*** | (1.002) |
| *Schooling splines* | | | | | | | | |
| Primary | –0.027$^{NS}$ | (0.974) | –0.031$^{NS}$ | (0.970) | –0.021$^{NS}$ | (0.979) | –0.027$^{NS}$ | (0.973) |
| Secondary | –0.092*** | (0.912) | –0.095*** | (0.910) | –0.075** | (0.928) | –0.068* | (0.934) |
| Tertiary | –0.262** | (0.769) | –0.251** | (0.778) | –0.232** | (0.793) | –0.212* | (0.809) |
| Couple | –0.244* | (0.784) | –0.240* | (0.787) | –0.233* | (0.792) | –0.205$^{NS}$ | (0.814) |
| Head of the household | –0.947*** | (0.388) | –0.935*** | (0.393) | –0.999*** | (0.368) | –0.996*** | (0.369) |
| Time spent in the present dwelling | 0.017** | (1.017) | 0.017** | (1.017) | 0.021*** | (1.021) | 0.021*** | (1.021) |
| Rural birth area | 0.434*** | (1.543) | 0.811*** | (2.250) | 0.394** | (1.482) | 0.394** | (1.483) |
| **Cross term effect** | | | | | | | | |
| Rural birth area*male | | | –0.792*** | (0.453) | | | | |
| **Household variables** | | | | | | | | |
| Ownership of the dwelling | | | | | –0.397*** | (0.672) | –0.393*** | (0.675) |
| Access to electricity | | | | | –0.509*** | (0.601) | –0.366** | (0.693) |
| **Neighbourhood variables** | | | | | | | | |
| Median income of the EA | | | | | | | –0.175** | (0.840) |
| Average commuting distance of workers living in the EA | | | | | | | 0.035* | (1.036) |
| Job density | | | | | | | 0.267$^{NS}$ | (1.306) |
| *Intercept* | 2.915*** | | 2.805*** | | 3.583*** | | 4.012*** | |
| *Likelihood ratio* | 363.4 | | 375.2 | | 376.7 | | 385.1 | |
| *Correctly predicted obs.* | 77.0% | | 76.5% | | 76.6% | | 76.6% | |
| Number of obs. | 1 877 | | 1 877 | | 1 870 | | 1 870 | |

Notes: Figures in brackets give the odds ratios.
* significant at a 10 per cent level; **significant at a 5 per cent level; ***significant at a 1 per cent level; $^{NS}$ not significant at a 10 per cent level

Model I presents the influence of individual variables on unemployment probability. Firstly, given South African history, the results confirm some expectations: Africans have a higher probability of being unemployed than whites. Indeed, Rospabé (2002) and Kingdon and Knight (2001) estimate the incidence of African-white discrimination in access to employment in the whole country. The greater economic integration of coloureds and Asians/Indians is reflected in the insignificance of the coefficient for these two population groups. Being a female increases the risk of being unemployed. To test how the employer's hiring choice and the worker's decision to enter the labour market are affected by the individual's endowment of human capital, three splines of education are introduced.[11] The incidence of unemployment decreases dramatically with education. However, primary education does not make individuals less likely to be unemployed. But an additional year of secondary education decreases the probability of being unemployed and this effect is reinforced with regard to tertiary education. One should note that these variables only reflect quantity of education, and thus can be poor indicators of the real level of education especially for African people, who suffered from low-quality schooling under apartheid. Indeed, Case and Yogo (1999) find that poor school quality significantly reduces the probability of employment for Africans. However, Kingdon and Knight (2001) estimate, on 'available weak evidence', that racial differences in unemployment probability do not seem to be, even partially, a result of differences in educational quality. The influence of age on the probability of unemployment is significantly negative, with diminishing returns. As Kingdon and Knight (2001) observe, younger people have a smaller chance of getting a job because employers might recoil at their high degree of job mobility. According to them, there is also evidence that younger people are more likely to enter unemployment voluntarily.

Being born in a rural area increases the probability of being unemployed. This result is difficult to interpret as we do not know when the individual leaves her birthplace to come to an urban area. One might think that recent migrants are more hampered in their job search than those who have been in urban areas for longer, as their labour market network is probably very limited. The only variable available to approximate roughly the time that migrants have spent in the CTUA is the date of arrival in the dwelling. But crossing this date of arrival with the rural origin does not provide any significant result. In a somewhat related perspective, two econometric studies (Van der Berg, Burger, Leibbrandt and Mlatsheni 2002; Posel and Casale 2003) underline the importance of taking gender into account in the study of internal labour migration in South Africa. To test whether gender matters in the influence of rural origin on unemployment, we introduce a cross term male/rural origin (model II). Results show that rural origin disadvantages more females than males in finding a job. We also include among the independent variables the time spent in the present dwelling, so as to capture the social integration of the individual into her area of residence. The longer time individuals have spent in the dwelling, the more likely they are to be unemployed. We do not have any straightforward interpretation for

this finding. We might think that these individuals have a low housing mobility, which impedes them in their search for a job. However, one should also highlight the endogenous nature of this variable, as being unemployed prevents one from moving. Finally, it is found that being married or the head of the family limits the probability of unemployment. On the supply side, this partly reflects the fact that greater family responsibilities induce entry into the labour market and lower the reservation wages. On the demand side, it may also indicate employers' preferences for workers with higher probabilities of staying with their current employers. Kingdon and Knight (2001) choose to exclude these two variables from their probit specification on account of their endogenous nature.

Turning to household variables (model III), we see that housing tenure decreases the probability of unemployment. This finding is in contradiction with the general literature which shows that home ownership impedes labour mobility and migration (and thus employment), because of higher associated transaction costs compared to renting (Cameron and Muellbauer 1998; McCormick 1997). Previous results on South Africa presented by Rospabé (2002) and Kingdon and Knight (2001) are consistent with this literature when considering Africans only, whereas for whites, home ownership is associated with a lower probability of unemployment. In this context, the negative effect can be explained if home ownership is a proxy for household wealth and is endogenous to unemployment (i.e. unemployment determines the chances of owning one's home). In order to test for these racial differences, we introduce a variable crossing the race group and ownership, but it does not appear to be significant.[12] Access to electricity has the same effect as home ownership, and decreases the risk of being unemployed.[13] Thus our findings mean either that it is easier for an individual in a wealthier household to find a job or that this variable might be endogenous.

Introducing neighbourhood variables in the regression, model IV shows that median income in the EA decreases the probability of unemployment. This result is consistent with some elements of the theory mentioned in the first section of the chapter: a socio-economic environment of higher quality facilitates human capital acquisition, and provides a better social network which may in turn improve the employability of individuals. We complement model IV by also taking into account spatial mismatch variables. The effect of local employment density[14] is not significant, whereas the average commuting distance of workers surveyed in the 'migration study' and living in the EA plays a positive and significant role in the unemployment probability. This means that controlling for all other variables, individuals who reside in EAs where employed workers occupy jobs far away are more likely to be unemployed. This result is in accordance with the theory on physical disconnection from jobs.[15]

## *Conclusion*

The explanation of unemployment usually revolves around well-known determinants (notably the lack of formal education or the skill mismatch between labour supply and labour demand). Alternative theories suggest that unemployment may also be determined by the spatial organisation of cities which concentrate disadvantaged families in poverty zones and/or distance them from job opportunities. This chapter has examined the particular case of Cape Town, and investigated the extent to which its spatial organisation could affect the labour market, an important issue for a country such as South Africa which is characterised by spatially stratified cities. We have studied the link between residential location and labour market outcomes by estimating the unemployment probability of individuals surveyed in different neighbourhoods of Cape Town. Although there remain some technical issues to resolve, our preliminary results suggest that, controlling for individual and household characteristics, there are important spatial factors that exacerbate unemployment: distance from jobs, rural origin (especially for women), and the length of time spent in the present dwelling. The next step required will be to deepen the econometric analysis and try to propose adapted policy measures to counter the identified spatial mechanisms of urban exclusion.

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***Notes***

1 This example was provided in Selod and Zenou (2001a).

2 See Selod (2001) for a detailed presentation of South African city structures.

3 Official data are usually given for the Cape Metropolitan Area (CMA), an aggregation of several hundred suburbs which, in the recent past, were grouped into six local municipalities. In the econometric analysis that we present in the following section, however, we use a somewhat different definition of the metropolitan area which in our view better corresponds to a functional definition of Cape Town in terms of economic integration. In our definition, we have excluded from the CMA the suburbs that belong to the northern part of the Blaauwberg municipality such as Atlantis which, in our opinion, should be viewed as a town in itself. We have labelled our working definition of Cape Town the 'Cape Town Urban Area' (CTUA). Like the CMA, the CTUA does not include distant places to the east and north-east such as Stellenbosch or Paarl. It extends south-east as far as Strand or Gordons Bay (see Figure 7.1). The CTUA hosts almost 2.4 million inhabitants, who reside in 401 different suburbs.

4 The dissimilarity index for Africans and whites for instance is given by:
$$\frac{1}{2}\sum_i\left[\frac{Africans_i}{Africans}-\frac{Whites_i}{Whites}\right]$$
where $Africans_i$ and $whites_i$ are the respective numbers of Africans and whites in suburb $i$ and *Africans* and *whites* are the respective numbers of Africans and whites in the whole urban area (Duncan and Duncan, 1955). This index represents the percentage population of one of these two groups which would have to be relocated in order to obtain a uniform mix of both groups in each suburb of the urban area. In the USA, a city with an index above 60 per cent is usually considered highly segregated.

5 The location of salaried jobs has been obtained by our treatment of the RSC Levy database, which we will explain in the third section of the present chapter.

6 However in South Africa, more than anywhere else, the endogenous risk of residential localisation is alleviated by the effect of apartheid policy, which did not leave much freedom to individuals in selecting their residential area.

7 Descriptive statistics on variables can be read in Table 7A1.1 in Appendix 1. Table 7A1.2 in Appendix 1 presents the correlation matrix.

8 An Enumerator Area (EA) is the smallest statistical area in South Africa and is the direct subdivision of a suburb. The Cape Town Urban Area, as we define it, is divided into 401 suburbs and 4 622 enumerator areas. The average size of an EA is 518 inhabitants (for a standard deviation of 277). This means that an EA corresponds to a small neighbourhood where individuals are likely to interact with one another. The largest EA in the CTUA has 2 006 residents.

9 In this stratified survey, 40 dwellings were randomly investigated in a random sample of 25 EAs. Africans are over-represented, since they account for 46.6 per cent of the sample (coloureds, whites, and Asians/Indians respectively account for 38.4 per cent, 12.3 per cent and 2.7 per cent of the sample).

10 The RSC Levy database contains information on all companies operating in Cape Town and paying a municipal tax to fund the provision of basic municipal services. In particular, companies are asked to declare their number of workers. In most cases, the registered address is the same as the address where the economic activity actually takes place. We were able to identify the locations of 407 348 salaried jobs within the CTUA as we define it.

11 These three splines cover primary, secondary and tertiary schooling respectively. The splines allow the effect on unemployment of each of the three schooling levels to vary, while implicitly assuming that the annual effects within each of the three schooling levels are identical. (See Moll 2000 and Rospabé 2002 for the use of similar variables.)

12 In our sample, 84 per cent of Africans are owners of their dwelling. As a result, taking into account the large number of shacks in the African informal areas surveyed in the 'migration study', home ownership does not seem to be a relevant measure of wealth for Africans.

13 This variable is more likely to be an indirect measure of wealth for Africans in the 'migration study' since only 62 per cent of them live in a household that has access to electricity.

14 We constructed several job density variables depending on the choice of the geographical perimeter: 5, 10 or 15 km. None of these variables were significant. We retain, in model IV, the job density within a 10 km perimeter.

15 In order to test whether this effect could be different for different race groups, we ran separate regressions for each race group. In all cases, distance to job is not significant. The most obvious interpretation is that racial residential segregation makes distance to job very homogenous within each race group, and thus erases any physical disconnection effect.



## *Appendix 1*

### *The determinants of unemployment*

**Table 7A1.1** *Variables used to estimate unemployment probabilities*

| Variable | Description | Database | Mean and standard deviation |
|---|---|---|---|
| **Dependent variable** | | | |
| Unemployed | = 1 if unemployed according to the official definition (excludes discouraged jobseekers) | Migration study (1998) | 0.276 (0.447) |
| **Individual variables** | | | |
| *Race group* | | | |
| African | = 1 if African | Migration study (1998) | 0.483 (0.500) |
| Coloured | = 1 if coloured | Migration study (1998) | 0.390 (0.488) |
| Asian/Indian | = 1 if Asian/Indian | Migration study (1998) | 0.028 (0.164) |
| White | = 1 if white | Migration study (1998) | 0.100 (0.300) |
| Male | = 1 if male | Migration study (1998) | 0.542 (0.498) |
| Age | = age in years | Migration study (1998) | 34.49 (11.17) |
| Age square | = age square | Migration study (1998) | 1 314 (857.1) |
| *Schooling splines* | | | |
| Primary | $\begin{cases} x, 0 \le x \le 7 \\ 7, x > 7 \end{cases}$ where x = years of schooling | Migration study (1998) | 6.479 (1.467) |
| Secondary | $\begin{cases} 0, x \le 7 \\ x - 7, 7 < x \le 12 \\ 5, x > 12 \end{cases}$ | Migration study (1998) | 2.618 (2.031) |
| Tertiary | $\begin{cases} 0, x \le 12 \\ x - 12, x > 12 \end{cases}$ | Migration study (1998) | 0.306 (0.758) |
| Couple | = 1 if married or living together | Migration study (1998) | 0.479 (0.500) |
| Head of the household | = 1 if is the head of the household | Migration study (1998) | 0.345 (0.476) |
| Time spent in the present dwelling | = number of years spent in the present dwelling | Migration study (1998) | 12.02 (10.86) |
| Rural birth area | = 1 if was born in a rural area | Migration study (1998) | 0.398 (0.490) |

| Variable | Description | Database | Mean and standard deviation |
|---|---|---|---|
| **Household variables** | | | |
| Ownership of the dwelling | = 1 if the household owns the dwelling | Migration study (1998) | 0.750 (0.433) |
| Access to electricity | = 1 if the household has access to electricity | Migration study (1998) | 0.804 (0.397) |
| **Neighbourhood variables** | | | |
| Median income of the EA | = income class (1 to 13) of the median worker | Census 1996 | 3.789 (1.189) |
| Average commuting distance of workers living in the EA | = average distance (in km) between the EA where the individual is living and the suburb where she is working | Migration study (1998) | 8.852 (4.068) |
| Job density | = number of jobs/active population (in a 10 km radius around the EA of residence) | Cape Town RSC Levy 2000 | 0.484 (0.374) |

**Table 7A1.2** *The correlation matrix*

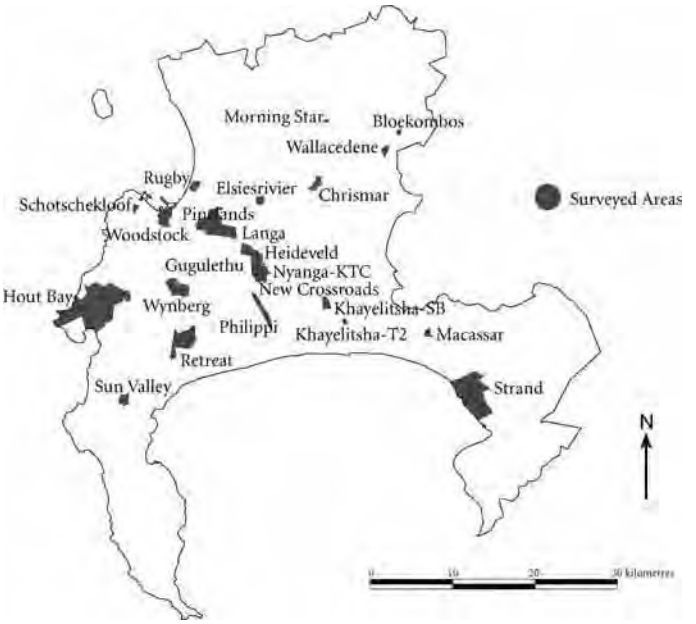
| Variable | Unem. | White | African | Asian/Indian | Coloured | Male | Age | Age sq. | Prim. | Sec. | Tert. | Couple | Hhead | Dwell. | Rural | Own. | Elect. | Incom. | Dist. jobs | Job density |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unemployed | 1.00 | | | | | | | | | | | | | | | | | | | |
| White | −0.12* | 1.00 | | | | | | | | | | | | | | | | | | |
| African | 0.22* | −0.32* | 1.00 | | | | | | | | | | | | | | | | | |
| Asian/Indian | −0.05* | −0.06* | −0.16* | 1.00 | | | | | | | | | | | | | | | | |
| Coloured | −0.13* | −0.27* | −0.77* | −0.13* | 1.00 | | | | | | | | | | | | | | | |
| Male | −0.09* | 0.06* | −0.02 | 0.03 | −0.03 | 1.00 | | | | | | | | | | | | | | |
| Age | −0.25* | 0.14* | −0.05* | 0.04 | −0.05* | 0.05* | 1.00 | | | | | | | | | | | | | |
| Age square | −0.23* | 0.15* | −0.07* | 0.05* | −0.04 | 0.05* | 0.99* | 1.00 | | | | | | | | | | | | |
| Primary | −0.06* | 0.12* | −0.16* | 0.05* | 0.07* | −0.01 | −0.17* | −0.18* | 1.00 | | | | | | | | | | | |
| Secondary | −0.13* | 0.29* | −0.29* | 0.10* | 0.08* | −0.01 | −0.17* | −0.17* | 0.46* | 1.00 | | | | | | | | | | |
| Tertiary | −0.15* | 0.27* | −0.22* | 0.08* | 0.03 | 0.00 | 0.03 | 0.02 | 0.14* | 0.47* | 1.00 | | | | | | | | | |
| Couple | −0.17* | 0.09* | 0.01 | 0.01 | −0.07* | 0.08* | 0.43* | 0.39* | −0.04 | −0.06* | 0.00 | 1.00 | | | | | | | | |
| Household head | −0.23* | 0.07* | 0.11* | −0.01 | −0.16* | 0.20* | 0.45* | 0.43* | −0.06* | −0.08* | 0.07* | 0.29* | 1.00 | | | | | | | |
| Time in dwelling | −0.04 | −0.11* | −0.34* | 0.14* | 0.37* | 0.01 | 0.16* | 0.17* | 0.05* | 0.01 | −0.02 | −0.15* | −0.09* | 1.00 | | | | | | |
| Rural origin | 0.17* | −0.15* | 0.61* | −0.14* | −0.48* | −0.01 | 0.03 | 0.02 | −0.22* | −0.32* | −0.20* | 0.10* | 0.11* | −0.34* | 1.00 | | | | | |
| Ownership | 0.00 | −0.08* | 0.19* | 0.05* | −0.17* | −0.02 | 0.04 | 0.04 | −0.03 | −0.01 | 0.04 | 0.00 | −0.02 | 0.02* | 0.14* | 1.00 | | | | |
| Electricity | −0.17* | 0.17* | −0.44* | 0.08* | 0.32* | −0.01 | 0.07* | 0.08* | 0.19* | 0.27* | 0.17* | −0.01 | −0.07 | 0.28* | −0.39* | −0.24* | 1.00 | | | |
| Area income | −0.20* | 0.47* | −0.38* | 0.12* | 0.06* | 0.02 | 0.17* | 0.17* | 0.16* | 0.41* | 0.36* | 0.14* | 0.05* | 0.07* | −0.26* | −0.13* | 0.42* | 1.00 | | |
| Distance to jobs | 0.13* | −0.21* | 0.50* | −0.13* | −0.34* | −0.03 | 0.02 | 0.00 | −0.03 | −0.11* | −0.11* | 0.02 | 0.06* | −0.19* | 0.37* | 0.12* | −0.29* | −0.24* | 1.00 | |
| Job density | −0.11* | 0.13* | −0.43* | 0.33* | 0.25* | 0.04 | 0.01 | 0.02 | 0.11* | 0.27* | 0.18* | 0.02 | −0.06* | 0.23* | −0.35* | −0.24* | 0.29* | 0.42* | −0.59* | 1.00 |

Note: * significant at a 5 per cent level.

## *Appendix 2*

*Migration and settlement in the Cape Metropolitan Area (1998)*

**Figure 7A2.1** *The surveyed neighbourhoods*

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