

ECONOMIC ANALYSIS WORKING PAPER SERIES

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Working Paper 5/2008



**DEPARTAMENTO DE ANÁLISIS ECONÓMICO:
TEORÍA ECONÓMICA E HISTORIA ECONÓMICA**

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Abstract:

Studying the relation between workers' nationality and their commuting time has been of paramount importance in countries with high immigration rates and ethnical heterogeneity. Most of these studies focus on the spatial mismatch of racial minorities, and consider urban and social structures of the countries/cities where this segregation phenomenon may occur. Currently, immigration is one of the main challenges of the Spanish society. Foreign residents in Madrid region increased 639 % between 1996 and 2004. In this paper we explore the connection between commuting time, residential location and worker's nationality using an ordered logit model. Our findings reveal that immigrants from 'transition economies' and 'third world' countries are significantly more likely to suffer higher commuting times compared to natives. These differences can be explained by both housing and labour market restrictions due to discrimination. This commuting penalty is in line with the spatial mismatch hypothesis and residential segregation.

***JEL Classification:* R15**

Key words: *Commuting* flows; Immigration; Spatial mismatch; Labour mobility;

1. Introduction

Commuting flows provide information about a wide variety of issues related to households and firms' decisions (location and propensity to migrate, etc.). It also offers valuable insights in order to detect spatial mismatch between the labor supply and demand for different sectors and social groups (Crampton, 1999).

Studying the relation between workers' nationality, residence and employment decisions, and their commuting time has been of paramount importance in countries with high immigration rates or ethnical heterogeneity.

In the last years, immigration has become one of the main challenges faced by the Spanish society. The number of foreign residents in Spain has increased from 280,000, at the beginning of the nineties, to 2 million people in 2004. If trends in immigration are analyzed by country of origin, a sharp increase in the "third-world" component is revealed over the last few years.

As in other host European countries, immigrants' settlement patterns in Spain are characterized by spatial clustering. Analyses have shown that minority ethnic groups remain spatially concentrated in particular parts of the urban and regional system, and that they are over-represented in areas of socioeconomic disadvantage.

This feature, combined with the increasing dispersion of metropolitan employment areas, and the concentration of these workers in certain branches of the economic activity (mainly domestic service, construction, hotels and restaurants) might have lead to significant differences in commuting behaviour between nationals and immigrants.

Immigrants, as other disadvantaged groups, experience a weaker position in different aspects of their participation in the labour market compared to the average attainments of all individuals. This disadvantage position may be apparent across a range of indicators. For instance, immigrants earn lower wages and they tend to be concentrated/ segregated within certain industries and occupations. Presumably this weaker position in the labour market

could also affect the commuting time of immigrants, which could be explained by discrimination and/or spatial mismatch. The social discrimination faced by immigrants interacts with spatial concentration, restricting their choice set for job and residence location, potentially affecting the commuting behaviour in this collective. If discrimination does not exist, there would be no differences in commuting between nationals and immigrants others than those explained by factors distinct of nationality.

Spatial mismatch hypothesis states that the concentration of poverty and joblessness within predominantly non national neighbourhoods can be explained, in part, by the geographic isolation of these neighbourhoods from job locations. If this hypotheses is combined with residential segregation (Massey,1990) and transportation mismatch (Boardman and Field,2002, Taylor and Ong, 1995) it is reasonable to expect higher commuting times amongst immigrants.

A priori, immigrants could experience either lower or higher commuting times with respect to their natives counterparts. On the one hand, commuting distances for ethnic groups could be shorter if these people have lack of access to a private vehicle (Blackaby et al., 1999). But on the other hand, if immigrants experience higher unemployment rates and lower wages in their local labour markets, they may be willing to accept more distant employment, simply in order to gain employment and thereby raise earnings (McCormick, 1986). Thus, an empirical analysis seems to be necessary in order to disentangle the puzzle on whether immigrants suffer lower or higher commuting times with respect to natives.

We focus the analysis in the Madrid region because of two reasons. First, the significant increase in the migration phenomenon, and second the intense process of suburbanization experienced in this region in recent years.

For the purpose of this paper, we use data from the 2001 Census from the National Statistics Institute of Spain (*Censo 2001*), and we adopt an econometric approach based on ordered logit models. Our results suggest the existence of significant differences in

commuting times between immigrants and natives that can be interpreted as a sign of discrimination.

The paper is organized as follows. In Section 2 we provide a short review of the literature. Section 3 highlights the localization patterns of individuals and jobs in the Madrid region, jointly with a descriptive analysis of the data set. Section 4 presents the econometric model and main results and Section 5 concludes.

2. Previous literature

Commuting is intimately linked with decisions concerning residential location and workplace. Optimality in both dwelling and employment location choices also implies an optimal commuting time¹ given the preferences, (possibly) labour and residential market rigidities, personal characteristics and restrictions faced by individuals.

In search models which simultaneously analyze labour and residence decisions (Van Ommeren et al. (1997, 2000) among others), workers search a combination of job and residence that maximizes their intertemporal utility. The individuals continuously search for better jobs and dwellings, maximizing the discounted future flow of wages, place utilities, minus commuting costs, taking into account the costs of changing jobs and residences. The commuting behaviour is the final product of a combination of labour and residential markets features and an individual decision-making process accepting or rejecting an offer.

From a theoretical point of view and in the context of search models, commuting time is affected by rigidities and imperfections affecting the housing and/or the labour market. In the model of Van Ommeren et al. (1997, 2000) these imperfections act in two ways. First,

¹ Optimal commuting time does not necessarily mean “minimum commuting time among the existing alternatives”.

they impose higher costs on individuals when they decide to move to another residence or to change job. And second, they diminish the arrival rate of new dwelling and/or job offers.

Market imperfections and rigidities affect commuting behaviour since they restrict the ability of individuals to change residence and/or job. As a result, the job and/or dwelling decisions and the actual commuting time can be far away from the optimal ones.² In particular, Van Ommeren et al. (1997) demonstrate that, in general, the existence of higher costs of moving residence, or lower probabilities of receiving a new dwelling offer increase the commuting.

In spite of the absence of explicit estimates of these rigidities and onto the arrival of rate of new offers, it is plausible to think that these variables must be relevant. As suggested by the literature, these market imperfections are related to many factors, as individual and familiar characteristics, institutional and regulatory framework, capital market imperfections and housing tenure.

Regarding the influence of individual and familiar characteristics, Mac Auley and Nutty (1982) and Van Ommeren et al.(1999), indicate that residential mobility strongly depends on the stage in the life cycle of individuals. Dohmen (2005) presents a review of stylized facts about mobility, and he states that high-skilled workers migrate more than their low-skilled counterparts. Another example is provided by Van Ommeren et al. (1997), who point out that couple with both members employed commute more since it becomes more difficult to adapt their residence to job location.

The institutional features of housing markets impose restrictions to the ability of individuals to freely switch their residence location. There exists an enormous variety of forms and examples of institutional restrictions collected by the academic literature. An extreme case is the governmental refugee settlement policy pursued in the 80s in Sweden, which imposes individuals the location where they can reside (Aslund, 2005). Van Ommeren

² Following Hamilton (1982) and Small and Song (1992), such suboptimality is reflected in terms of wasteful or excess commuting.

et al. (1999) point out that many properties in the Dutch housing market are owned by housing associations that use waiting lists and do not supply the property to the highest bidder. In the Spanish case, municipal authorities use to subsidise housing through regulated prices for specific collective, requiring a previous period of residence in the municipalities.

Among others, Pinto (2002) argues that the existence of imperfect capital markets acts as a barrier preventing some people from changing their residence location, since individuals must consider not only the cost and benefits from moving, but also the availability of housing finance. As result, people who cannot borrow will be constrained in terms of their capability of changing residence location, and therefore, they will be subject to excessive commuting.

The influence of housing tenure on the propensity to change residence, and indirectly on the commuting time, also has received great attention in the literature. Green and Hendershott (2001) suggest that home-ownership reduces mobility, owing to a variety of factors including the lump-sum costs associated with buying, financing and/or selling a house. Van Ommeren et al. (1999) point out the differences on moving costs as an explaining factor of the differences on residential mobility between renters and owners. Henley's (1998) work supports the idea that migration flows are unresponsive to the state of labour market, since the owners-occupiers propensity to move is insensitive to the existence of high unemployment. In terms of commuting, this author indicates that high transaction cost for owner-occupiers may deter commuters from seeking a better match between dwelling and job.

Focusing the analysis of residential and job location in the immigrant collective, some additional issues have been cited in the literature that must be considered. Nationality is an individual characteristic that influences commuting times given their relevance in determining the initial and subsequent residence location³. As pointed out by Zavodny (1999) and Bartel (1989), the most important factor determining the location choices of new immigrants is the presence of earlier ones. This clustering behaviour may be indicative of the existence of

³ This assertion may be mediated by several variables, as level of education, country of origin, language and occupation or legal restrictions (Aslun, 2005).

informal ethnic networks for new immigrants that provide them with information about jobs and housing, or serve as an indicator of the generosity of the local welfare system (see (Borjas, 1999))⁴. Immigrant's subsequent location choices, i.e., relocations within the host country, benefit from learning about location advantages that may alter the initial settlement pattern. However, there is no clear evidence on the literature about immigrant's mobility, as Rephann and Vencatasawmy (1999) point out, since the immigrant clusters may offer non-monetary benefits (or cost of moving in a wide sense) that erode the advantages to move.

Limited fluency in host country language and lack of qualifications and skills may also create barriers to labour market success for some immigrant minorities, reducing the arrival rate of job offers, and limiting their ability to get a suitable combination of dwelling and job.

Finally, commuting time can also be influenced by access to transport. In particular if individuals have limited access to fasten⁵ transport modes their commuting times would be significantly higher (see Preston et al. (1998)).

3. Descriptive analysis

3.1. The spatial concentration of population, employment and commuting flows by nationality in the Madrid region

Between 1996 and 2004 foreign population living in Madrid region increased by 639%, growing from 95,141 immigrants to 703,343 (12 % of the whole population). The main origin of immigrants was South America (45%), Africa (14%), UE (12%) and the non-UE countries (12%). Most of Latin-American immigrants come from Ecuador (18,5%) and Colombia (11,6%), while the most prevalent origin for Africans is Morocco (72%).

⁴ Others alternative and complementing explanations for this behaviour are the ethnic goods theory proposed by Chiswick and Miller (2001) and the herd effect theory by Epstein (2002).

⁵ As suggested in Taylor and Ong (1995), despite increasing commuting distances over time, the average commuting time remains unchanged between 1977 and 1985. They argued that this fact can be explained by the increasing use of private vehicles.

In 2004, 64% of immigrants were located in Madrid municipality, representing 13 % of the whole population. However, the use of location coefficients reveals that the highest concentration takes place in municipalities relatively far away from Madrid centre (Figure 1). The analysis of the data reveals two contrary tendencies in the location of immigrants. On the one hand, a significant proportion of them reside in Madrid municipality, in zones characterized by deteriorated neighborhoods. And, on the other hand, other groups are located in municipalities far away from Madrid city center.

The data also reveal interesting spatial concentration patterns of immigrants by country of origin. In Table 1 we report the concentration coefficients of foreign people using the official names of spatial areas (Vinuesa, 2004). The coefficients are calculated by:

$$p_{s/r}^o = \frac{p_s^o}{p_R^o}, \text{ where } p_s^o \text{ denotes the proportion of immigrants from origin, } o, \text{ in spatial area, } s,$$

and p_R^o is the proportion of immigrants with the same origin in the whole region, R :. Thus, coefficients larger than one indicate higher levels of concentration in a specific area compared to the relative weight of this group in the region.

The concentration coefficients calculated using data from the 2001 Census, reveal interesting differences in patterns of location. Immigrants coming from non-EU European are mostly located in the East-crown (along road N-II), while Moroccans are found in the South-crown and non-metropolitan municipalities, and Caribbeans and Asiatics are clustered in the city centre. Finally, South Americans, the most important group of immigrants, do not exhibit a clear pattern of spatial concentration. It is also worth of mentioning the strong concentration of non-nationals coming from EU and North American countries in the North and West-Crown, areas with the highest prices of housing in the region.

Based on the information provided by the 2001 Census, we built two “OD matrices” representing the origin and destination of inter-municipal commuter flows⁶ for both, the whole amount of workers (Figure 2A) and immigrants separately (Figure 2B)⁷.

Figure 2A shows that Madrid Municipality is the main destination of the majority inter-municipal flows, in line with the mono-central model of urban development experienced in Madrid metropolitan area in the last years. Furthermore, differences can be appreciated in the spatial structure of immigrants and total workers OD matrices as showed by the “Le Masne Similarity Index” (De Mesnard, 2004)⁸. As suggested in Llano (2006), we use this index in order to compare these two OD matrices. We obtain a value of 81,36%, that indicates the presence of significant differences in commuter flows.⁹

As an additional indicator of similarities amongst national and immigrant workers we focus the analysis only in those inter-municipal flows with destination Madrid centre. As in previous studies (Llano, 2006), the municipalities of origin are sorted according to their proximity in kilometres to Madrid centre, distinguishing two groups, depending on the direction of the flow: those coming from the Southern-East, and those from the North-West axis.

As can be observed in Figure 3 the concentration of national and immigrant commuters is similar in those municipalities with a larger distance from Madrid centre. However, the relative concentration of national commuters is always higher in the nearest municipalities (less than 25 Km from Madrid municipality). This fact is in line with the positive correlation of housing prices and the distance to Madrid centre.

⁶ Intra-municipal commuter flows are excluded.

⁷ For simplicity, the municipalities in both figures are sorted in the same way.

⁸
$$S_i(P^{k_1k_2}, P^{k_3k_4}) = 100 * \left(1 - 0,5 * \sum_{i=1}^n \sum_{j=1}^n |p_{ij}^{k_1k_2} - p_{ij}^{k_3k_4}| \right)$$
; being $p_{ij}^{nsa} = \frac{f_{ij}^{nsa}}{P^{nsa}}$ the intensity of inter-municipal flow between every pair of the 179 municipalities in the Madrid region. The index takes values between 0-100, being similarity index equal 100 when both matrix share the same structure.

⁹ In Llano (2006) the index is calculated by sector of activity. The results are the following: 70,24% in Agriculture, 75,96% in Industry, 75,54% in Construction, and 81,28 in Services.

It is expected that the aforementioned differences between nationals and immigrants are conditioned by other variables as: the sector of activity, the proportion of immigrants with the same nationality living in the municipality, the housing tenure and the household characteristics. Moreover, according to the international literature, it could be expected that commuting structures are also conditioned by rigidities and imperfections both, in the housing and the labor market. In order to address this question, in the following sections, we carry out a more-in-depth analysis of the differences in commuting times between nationals and immigrants. For that purpose we use data extracted from Spanish Census 2001.

3.2. Data description: *Census 2001*

The *Census 2001* is conducted, every 10 years, by the National Statistics Institute of Spain (*INE*). The questionnaire collects both household and personal information, and it allows us to distinguish between nationals and non-nationals. Furthermore, amongst non-nationals we can observe the corresponding nationality. For the purpose of this paper, we select a sample of wage and salary workers aged between 16 and 64 years old, living in the Madrid region, in municipalities with more than 20,000 inhabitants.¹⁰

Table 2 describes the main characteristics of the selected sample. The variables, used later as explanatory variables to study the determinants of the commuting time, relate to personal, household and job characteristics: nationality, gender, age, marital status, household type, education, type of contract, housing tenure, transport mode and a set of activity dummies¹¹. As can be observed in Figure 4, the majority (almost 60%) of immigrants living in the Madrid region comes from Latin-American countries. The second most common nationality corresponds to people coming from Other European countries (different from the

¹⁰ Census 2001 does not provide disaggregated information on municipalities with less than 20,000 inhabitants.

¹¹ Since the 2001 Census does not include “income” as an specific variable, the economic level of individuals have to be captured including different variables like education, type of contract and housing tenure.

EU-15) and Africa . The descriptive statistics also reveals significant differences between nationals and immigrants with respect to different aspects. As shown in Figure 5 renting is significantly more likely amongst immigrants compared to nationals. More than 70 percent of immigrants are renters, while the corresponding percentage amongst nationals is less than 10 percent. This difference can be explained by differences in the access to the housing market. Taking into account the increasing trends in housing prices in Spain, and since the majority of immigrants tend to be occupied in less skilled jobs, with lower wages, it is not surprising that renting was the most common form of housing tenure among them.

Significant differences can also be appreciated regarding the transport mode. As can be observed in Figure 6, most immigrants take public transport to commute to their workplace (almost 70 percent), whereas no significant differences can be observed in the use of private and public transports amongst nationals. This result would be due to the fact that, in general, immigrant people do not have access to a private vehicle, either due to legal (driving licence provided by Spanish authorities is compulsory) or economic motives.

The descriptive statistics also shows that immigrants tend to be concentrated in certain activities. As reported in Figure 7, the presence of immigrants is significantly high in construction; hotels and restaurants; and other community, social and personal service activities, private households with employed persons, extra-territorial organizations and bodies.

Finally, Figure 8 shows different patterns in terms of commuting times can be observed between nationals and immigrants. In particular, it can be observed that immigrants experience higher commuting times than their national counterparts.

4. Econometric model and main results

In this section we aim to a more-in-depth analysis of the main factors determining the commuting time, where special attention will be given to the effect of nationality. In

particular, we try to address the question whether immigrants experience higher commuting times than their national counterparts.

As the variable to be explained is offered in the Census as an ordered and discrete variable, we have to rely on ordered regressions. In particular, we estimate an ordered logit model to study the determinants of commuting time. Consider the following dependent variable:

$$y_{ij} = \begin{cases} 1 & \text{if individual } i \text{ belongs to category } j \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

where $i = 1, \dots, N$; $j = 1, \dots, m$, and where j can be thought of a commuting time profile, such that:

Categories	Commuting times
$j=1$	<10 min.
$j=2$	10-20 min.
$j=3$	21-30 min.
$j=4$	31-45 min.
$j=5$	46-60 min.
$j=6$	61-90 min.
$j=7$	>90 min.

Let y^* be a latent variables which can be modelled as:

$$y_i^* = \beta' x_i + \varepsilon_i ; \varepsilon_i \sim Logistic(\theta = 1) \quad (2)$$

that is, y^* can be explained by k explanatory variables contained in x . The logistic distribution with mean 0 has the following probability density function:

$$f(x) = \frac{1}{\theta} \frac{\exp(x/\theta)}{(1 + \exp(x/\theta))^2} \quad (3)$$

The individuals are classified into the $m=7$ categories by the following rule:

$$\begin{aligned} y_{i,1} &= 1 \text{ if } y_i^* \leq \alpha_1 \\ y_{i,j} &= 1 \text{ if } \alpha_{j-1} < y_i^* \leq \alpha_j \text{ for } j = 2, \dots, m-1 \\ y_{i,m} &= 1 \text{ if } \alpha_{m-1} < y_i^* \end{aligned} \quad (4)$$

Combining (1), (2) and (3), we obtain that:

$$\begin{aligned} P(\text{individual } i \text{ belongs to category } j) &= P(y_{ij} = 1) \\ &= P(\alpha_{j-1} < y_i^* \leq \alpha_j) = P(\alpha_{j-1} < \beta' x_i + \varepsilon_i \leq \alpha_j) \\ &= P(\alpha_{j-1} - \beta' x_i < \varepsilon_i \leq \alpha_j - \beta' x_i) \\ &= F(\alpha_j - \beta' x_i) - F(\alpha_{j-1} - \beta' x_i) \end{aligned} \quad (5)$$

where F denotes the cumulative density function of the logistic distribution.

The parameters of the model can be estimated using maximum likelihood technique.

The likelihood function has the following expression:

$$\begin{aligned} L(\alpha, \beta) &= \prod_{i,j} P(y_{ij} = 1) = \prod_{i=1}^n \prod_{j=1}^m P(y_{ij} = 1)^{y_{ij}} = \\ &= \prod_{i=1}^n \prod_{j=1}^m [F(\alpha_j - \beta' x_i) - F(\alpha_{j-1} - \beta' x_i)]^{y_{ij}} \end{aligned} \quad (6)$$

so that, the log-likelihood function is given by:

$$\ln L = \sum_i \sum_j y_{ij} \ln [F(\alpha_j - \beta' x_i) - F(\alpha_{j-1} - \beta' x_i)] \quad (7)$$

Table 3 presents the estimation results of the ordered logit model. To better understand the result we present them in terms of marginal effects instead of coefficients. Our main interest is on the dummy variables identifying the nationality. As can be observed, immigrants coming from European countries different than EU-15, and Africa are significantly more likely to suffer higher commuting times compared to nationals. In particular, we find that an

individual who only differs from the reference in that he/she is an immigrant from a European country different from EU-15 has 1.67 times the probability of having higher commuting time. For the case of immigrants coming from Latin-American countries, the results reveal no significant differences with respect to nationals. This result could be explained by the fact that these immigrants benefit from cultural and linguistic similarities with nationals that are absent in the rest of collectives.

It is worth of mentioning that an individual who only differs from the reference in that he/she is non-national coming from Asia or Oceania, has a probability of suffering higher commuting 1.123 ($=1/0809$) times lower than a national counterpart. This apparently misleading result could be attributed to the high specialization of these collectives in activities which imply lower commuting times.

The larger commuting times experienced by certain types of immigrants can be explained by both housing and labour market imperfections. On the one hand if immigrants, due to discrimination, have lower probabilities of receiving a residential offer, the probability that residential location was close to their workplace would be lower. This is consistent with the common view that individuals with a lower ability to adapt their housing situation to their workplace will have larger commuting distances (see Rouwendal and Rietveld, 1994). On the other hand, as predicted by the search theory, those individuals who receive more job offers tend to commute less. The fact that immigrants tend to be spatially concentrated in areas of socioeconomic disadvantage, obviously reduces the arrival rate of job offers, so that they may be willing to accept more distant employment simply in order to gain employment and thereby raise earnings.

Regarding the effects of other variables, several points are worth noting. Males, older workers, and workers being the reference person in the household experience higher commuting times. The household type seems to affect commuting times too. In particular, taking those individuals who are single and without children as the reference group, we find

that those living in a couple with children experience higher commuting times. The type of contract is found to be another important factor in determining the commuting time. The results reveal that those workers holding a temporary contract are 1.115 times more likely to experience higher commuting times than those with a permanent contract. Housing tenure is also found to be of paramount importance in explaining commuting times. Taking owners without mortgage as the reference category, we find that renters and those workers living in free housing experience lower commuting. Finally, transport mode is found to significantly affect commuting times. In particular, the estimation results reveal that using public transport increases commuting times.

5. Concluding remarks

In this paper we aim to explore the connection between commuting flows, residential location and worker's nationality using an ordered logit model to elucidate the main determinants affecting the commuting time. Our findings reveal that, after controlling for residence location, housing tenure, educational level and demographic variables, immigrants coming from European countries different than EU-15, Africa, and South and Central America are significantly more likely to suffer higher commuting times compared to nationals. These differences can be attributed to both housing and labour market restrictions due to discrimination. This is consistent with the common view that persons with a lower ability to adapt their housing situation to their workplace will have larger commuting distances. This commuting penalty is in line with the spatial mismatch hypothesis and residential segregation. Several factors might yield this conclusion. First, immigrants usually suffer higher restrictions in the housing market. Second, they tend to be located in areas of socio-economic disadvantage where ethnic network operates. And finally, they tend to be concentrated within

certain industries and occupations. All these factors restrict the job and dwelling choice set, so that immigrants may be willing to accept a combination of job and residence location associated to larger commuting times.

References

- ASLUND, O (2005): “Now and forever? Initial and subsequent location choices of immigrants”. *Regional Science and Urban Economics* 35 (2005) 141-165.
- BARTEL, ANN P.. (1989). “Where do the new US immigrants live?”. *Journal of Labor economics*, 7, pp 371-391.
- BLACKABY, D., LESLIE, D., MURPHY, P. AND O’LEARY, N. (1999). “Unemployment among Britain’s ethnic minorities”. *The Manchester School* , vol 67, pps 1-20.
- BOARDMAN, JASON D. AND FIELD, SAMUEL H.(2002). “Spatial mismatch and race differentials in male joblessness: Cleveland and Milwaukee, 1990”. *The Sociological Quarterly*,43, pp. 237-255.
- BORJAS GJ (1998) “To Ghetto or Not to Ghetto: Ethnicity and Residential Segregation”. *Journal of Urban Economics* 44, 283-253.
- BORJAS GJ (1999) “Does immigration and welfare magnet”. *Journal of Labour Economics* 17 (4 pt.1),607-637.
- CERVERO, R., WU, K.L., 1997. “Polycentrism, *commuting*, and residential location in the San Francisco Bay Area”. *Environment and Planning A* 29, 865–886.
- CHESIRE P.C.; E.S. MILLS (1999): Handbook Of Regional And Urban Economics Volume 3. Applied Urban Economics. Edited by P.C. Cheshire, University of Reading, Reading, UK, E.S. Mills, Princeton University, Princeton, NJ, USA.
- CHISWICK. B. R. AND MILLER, P.W.(2001). “Do enclaves matter in immigrant adjustment?”, *IZA Discussion Paper* 449.

- CRAMPTON G.R.(1999): “Urban Labour Markets”. In Chesire P.C.; E.S. Mills: Handbook Of Regional And Urban Economics, Volume 3. Applied Urban Economics. Edited by P.C. Cheshire, University of Reading, Reading, UK, E.S. Mills, Princeton University, Princeton, NJ, USA
- CHUNG, C., S. L. MYERS JR., AND L. SAUNDERS. 2001. “Racial differences in transportation access to employment in Chicago and Los Angeles, 1980 and 1990”. *American Economic Review* 91: 174–77.
- DE MESNARD, L. (2004): “Biproportional Methods of Structural Change Analysis: a Typological Survey”. *Economic Systems Research*, Vol. 16, No 2.
- DOHMEN, THOMAS J. (2005). “Housing, mobility and unemployment”. *Regional Science and Urban Economics*, 35. pp. 305– 325.
- EPSTEIN, G. S. (2002). “Informational cascades and decision to migrate”. *IZA Working Paper* 445.
- FUNKHOUSER, E. (2000): “Changes in the geografic concentration and location of residence of immigrants”. *International Migration Review* 34 (2), 489-510.
- GOFFETTE-NAGOT F. (2000): “Urban Spread Beyond the City Edge” in Huriot, JM; Thisse, JF (2000): *Economics of Cities: Theoretical perspectives*. Edited by Jean Marie Huriot and Jacques-François Thisse.
- GREEN, RICHARD K. AND HENDERSHOTT, PATRIC H.(2001). “Home-ownership and Unemployment in the US”. *Urban Studies*, 38, pp. 1509–1520.
- HAMILTON, B. W. (1982). “Wasteful commuting”. *Journal of Political Economy*, 90, pp. 1035-053.
- HENLEY, A. (1998). “Residential mobility, housing equity and the labour market”. *Economic Journal*, 108, pp. 414-427.
- MASSEY, DOUGLAS S. (1990). “American Apartheid: Segregation and the Making of the Underclass”. *The American Journal of Sociology*, 96. pp. 329-357.

- MCAULEY, WILLIAM J. AND NUTTY, CHERY L (1982). “Residential preferences and moving behaviour: a family life-cycle analysis”. *Journal of marriage and the Family*, 44. pp. 301-309.
- MCCORMICK, B. (1986). “Employment opportunities, earnings and the journey to work of minority workers in Great Britain”, *Economic Journal* vol 96, pps 375-397.
- PINTO, SANTIAGO M. (2002). “Residential Choice, Mobility, and the Labor Market”. *Journal of Urban Economics* 51, 469–496.
- PRESTON, V. S., AND S. MCLAFFERTY (1999). “Spatial mismatch research in the 1990s: Progress and potential”. *Papers in Regional Science* 78: 387–402.
- PRESTON, V. S., S. MCLAFFERTY, AND X. F. LIU. (1998). “Geographical barriers to employment for American-born and immigrants workers”. *Urban Studies* 35 (3): 529–45.
- KAIN, J.F. (1968). “Housing Segregation, Negro Employment, and Metropolitan Decentralization”. *Quarterly Journal of Economics*, 82(2), pp 175-197.
- REPHANN, TERENCE J. AND VENCATASAWMY, COOMAREN (1999). “Determinants of the spatial mobility of immigrants in Sweden”. *38 th Annual Southern Regional Science Association Meeting*.
- ROUWENDAL J., 1999: “Spatial job search and commuting distances”. *Regional Science and Urban Economics* 29 (1999) 491–517.
- ROUWENDAL, J., AND RIETVELD, P. (1994). “Changes in commuting distances of Dutch households”, *Urban Studies* vol 31, pps 1545-1557.
- SIMPSON, W (1992): “Urban Structure and the Labour Market: worker mobility, commuting and underemployment in cities”. Clarendon Press Oxford.
- SMALL, K. A. AND SONG, S. (1992). “Wasteful commuting: a resolution”. *Journal of Political Economy*, 100, pp. 888-898.
- SULTANA S. (2005). “Racial Variations in Males' Commuting Times in Atlanta: What Does the Evidence Suggest?” *The Professional Geographer* Vol. 57 Issue 1. Pp 66. Feb.

- TAYLOR, BRIAN D. AND ONG, PAUL M. (1995). “Spatial Mismatch or Automobile Mismatch? An Examination of Race, Residence and Commuting in US Metropolitan Areas”. *Urban Studies*, 32, pp. 1453-1473.
- VAN OMMEREN, J., RIETVELD, P., AND NIJKAMP, P. (1997). “Commuting: in search of jobs and residences”. *Journal of Urban Economics*, 42, pp. 402-421.
- VAN OMMEREN, J., RIETVELD, P., AND NIJKAMP, P. (1999). “Job moving, residential moving and commuting: a search perspective”. *Journal of Urban Economics*, 46, pp. 230-253.
- VAN OMMEREN, J., RIETVELD, P., AND NIJKAMP, P. (2000). “Job mobility, residential mobility and commuting: a theoretical analysis using search theory”. *The Annals of regional Science*, 34, pp. 213-232.
- VINUESA J. (2004). “Características demográficas de la Comunidad de Madrid según el Censo de 2001”. Edited by Consejería de Economía e Innovación Tecnológica: Instituto de Estadística de la Comunidad de Madrid. November.
- ZAVODNY, M, 1999. “Determinants of recent immigrants locational choices”. *International Migration Review* 33 (4), 1014-1030.

APPENDIX

A) Figures

Figure 1: Origin and spatial distribution of immigrant in the Madrid region.

Origin of non-national residents.

	People	%
South America	215.303	45,8
Africa	67.271	14,3
UE-15	58.600	12,5
Rest of Europe	55.791	11,9
Central Am.- Caribbean	34.893	7,4
Asia	24.107	5,1
North America	12.855	2,7
Oceania	1.080	0,2
Total	469.900	100,0

Source: 2001 Census. National
Statistic Institute

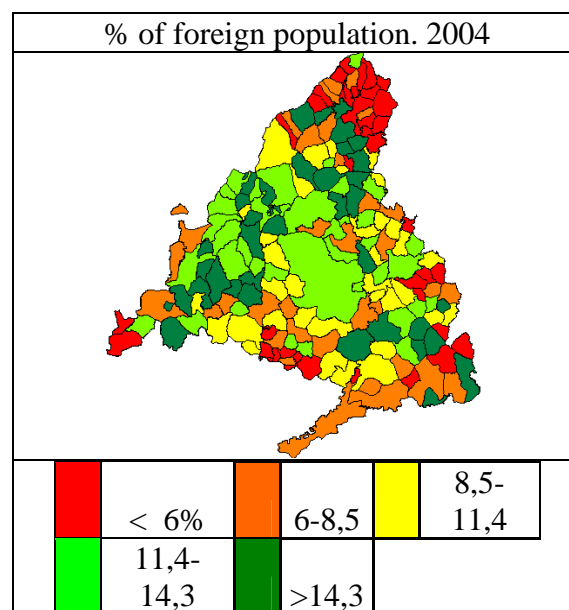
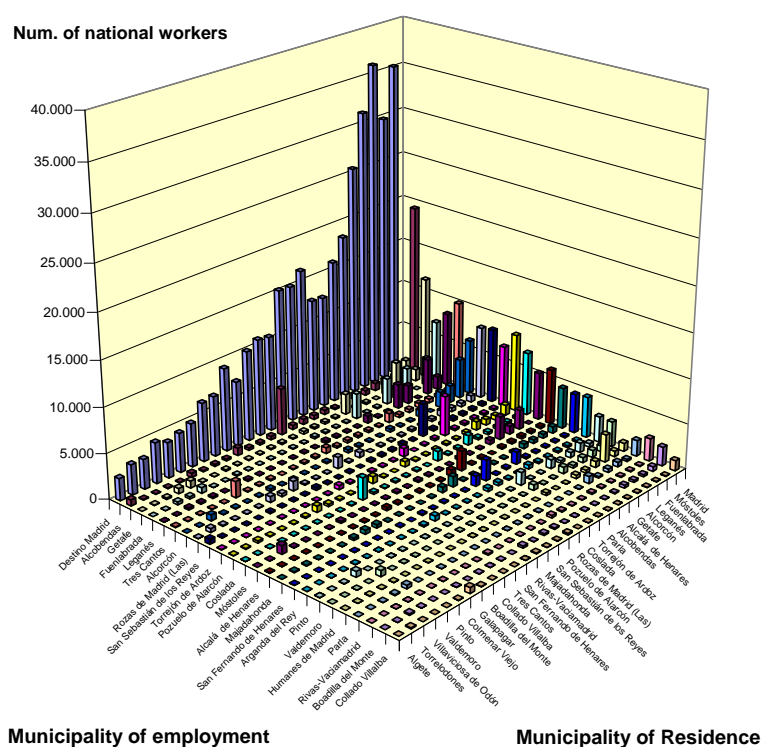


Figure 2: Inter-municipal flows of workers in Madrid region. Census 2001.

a) Total workers



b) Immigrants

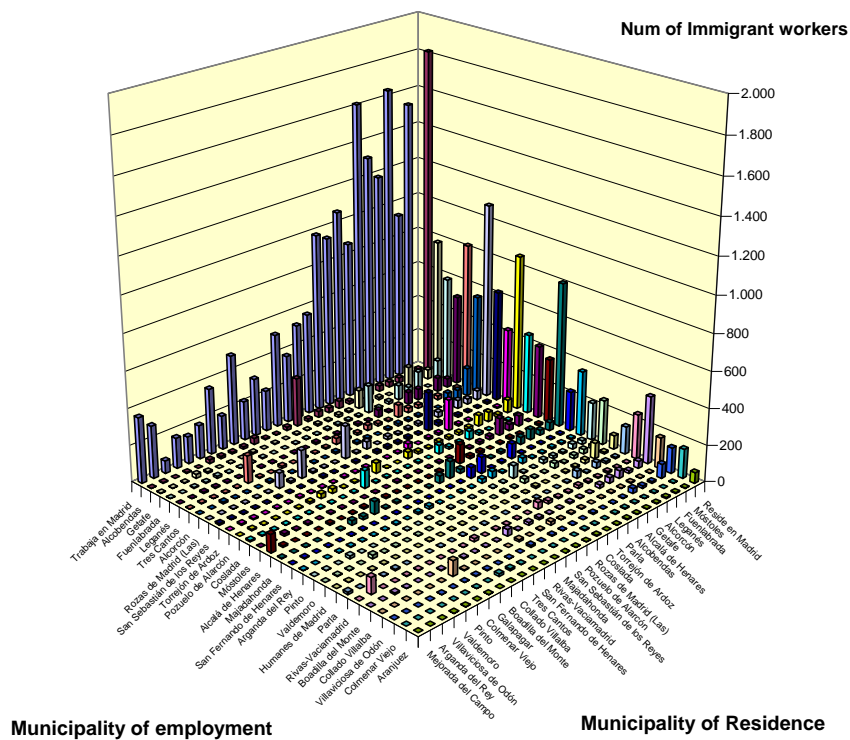


Figure 3: Concentration of national and immigrant commuters to Madrid centre by distance.

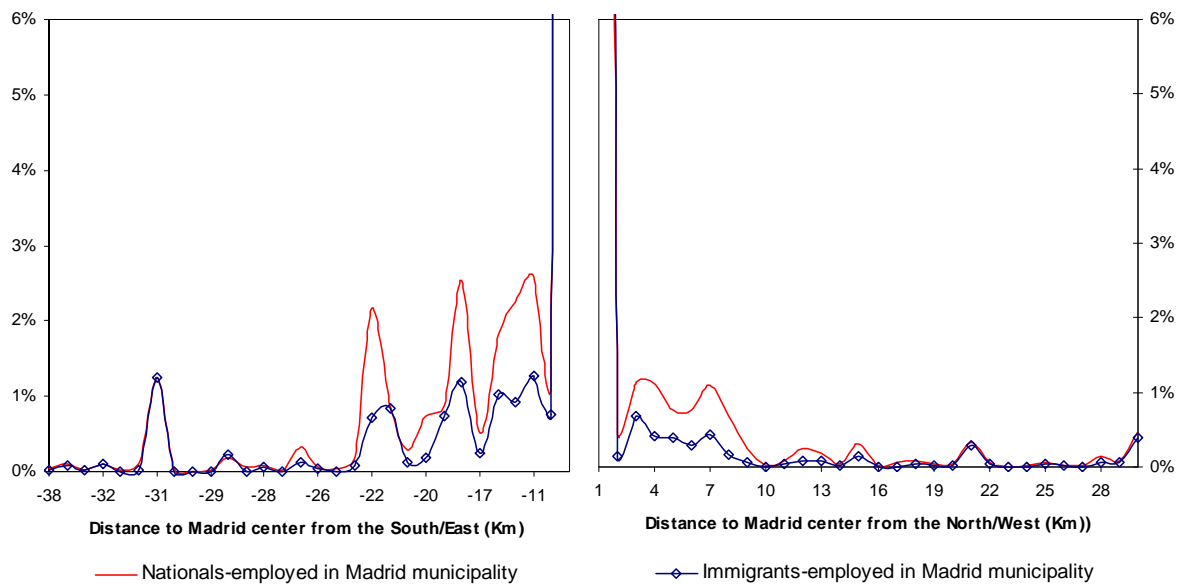


Figure 4: Immigrants

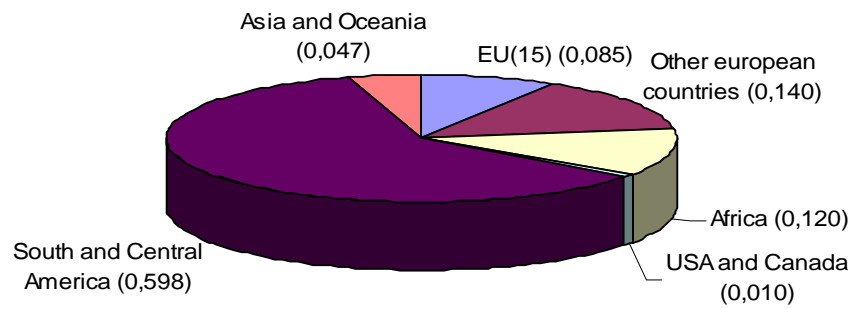


Figure 5: Housing tenure

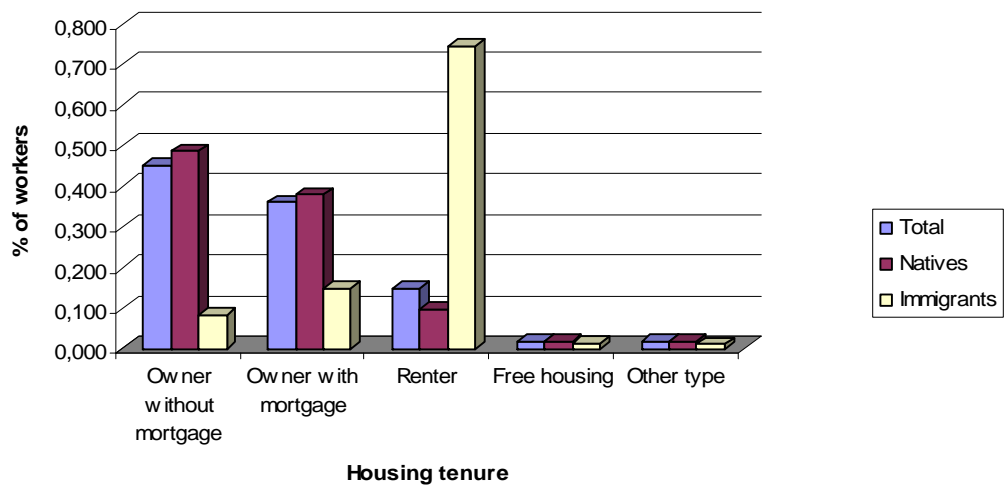


Figure 6: Transport mode

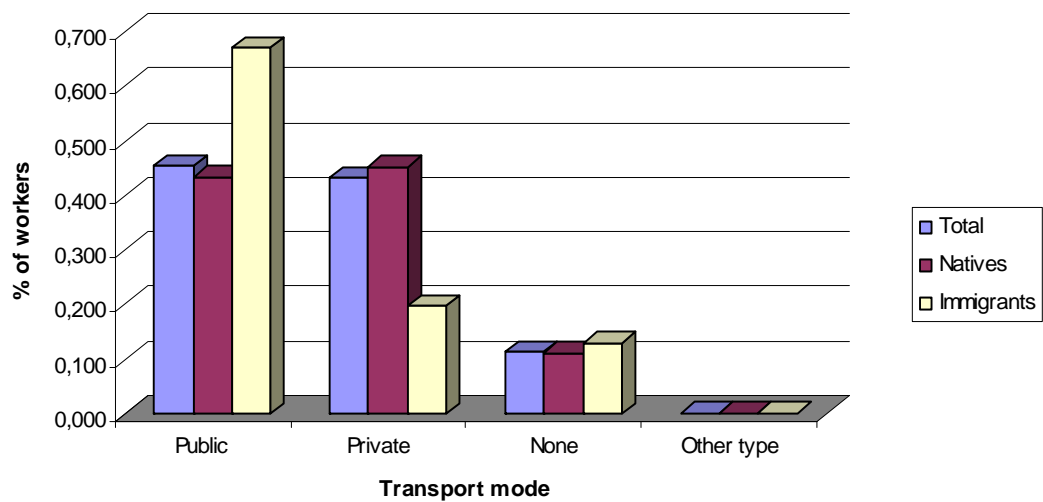


Figure 7: Sector of activity

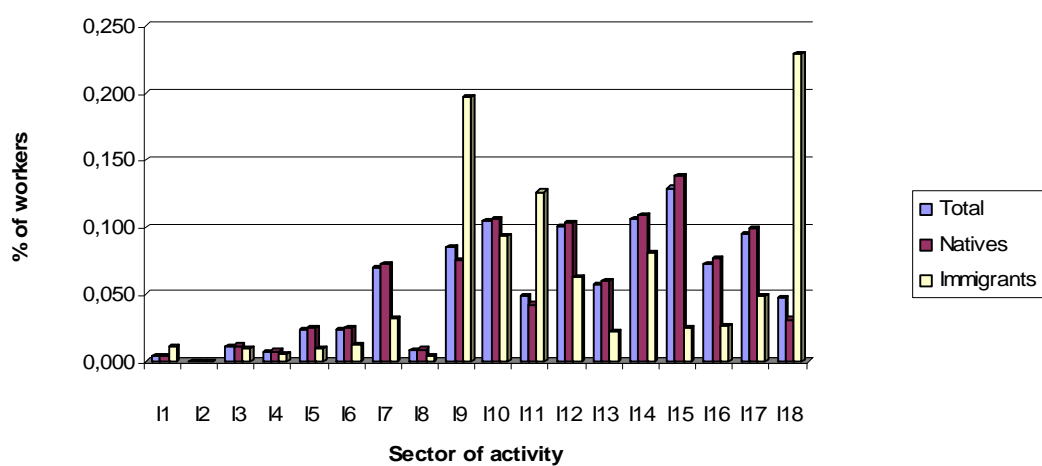
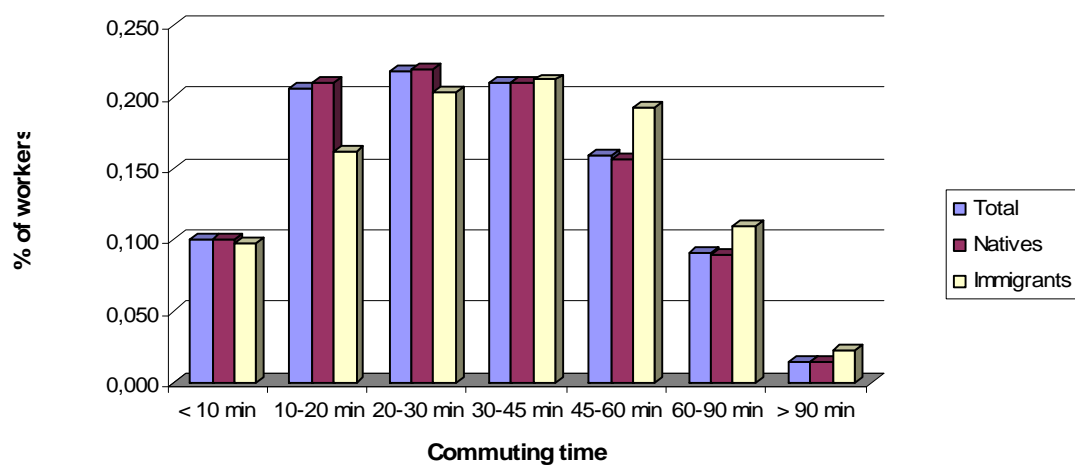


Figure 8: Commuting time



B) Tables

Table 1: Spatial concentration of immigrants. Census 2001									
2001 Census.	Total	EU 15	Rest of Europe	Africa	North America	Central A. Caribe	South America	Asia	Oceania
Madrid Region	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Madrid center	1,0	0,9	0,4	0,6	1,4	1,4	1,2	1,6	0,6
North-West periphery	1,0	1,2	0,6	0,7	1,4	1,0	1,1	1,2	0,9
East periphery	1,0	1,0	1,4	0,9	0,6	0,9	1,0	0,7	1,1
South periphery	1,0	0,6	0,9	1,0	0,3	1,0	1,2	0,9	0,7
North-crown	1,0	1,7	0,6	0,8	1,7	1,1	0,9	1,0	1,2
East-crown	1,0	0,9	3,1	1,0	0,7	0,8	0,6	0,6	1,4
South-crown	1,0	1,1	1,3	1,9	0,3	0,8	0,7	0,8	1,6
West-crown	1,0	1,4	0,6	0,9	2,4	0,9	1,0	1,0	0,9
Non-metropolitan m.	1,0	1,1	1,6	1,6	1,0	0,6	0,8	0,5	1,4
Source: (Vinuesa, 2004)									

Table 2: Descriptive Statistics (Mean)

	Total sample (N=86120)	Natives(N=79038)	Immigrants(7082)
<i>Commuting time</i>			
< 10 minutes	0,100	0,100	0,098
10 - 20 minutes	0,207	0,211	0,162
20 - 30 minutes	0,218	0,220	0,203
30 - 45 minutes	0,211	0,210	0,212
45 - 60 minutes	0,159	0,156	0,192
60 - 90 minutes	0,091	0,089	0,109
> 90 minutes	0,015	0,014	0,023
<i>Nationality</i>			
EU(15)	0,007		0,085
Other european countries	0,011		0,140
Africa	0,010		0,120
USA and Canada	0,001		0,010
South and Central America	0,049		0,598
Asia and Oceania	0,004		0,047
Male	0,638	0,644	0,567
Reference person	0,482	0,492	0,364
<i>Age</i>			
16-24	0,020	0,014	0,091
25-39	0,338	0,315	0,603
40-54	0,446	0,464	0,241
55-64	0,169	0,181	0,029
Married	0,756	0,773	0,568
<i>Household type</i>			
Single without children	0,405	0,395	0,519
Couple without children	0,142	0,136	0,211
Single with children	0,047	0,046	0,063
Couple with children	0,406	0,423	0,207
<i>Education</i>			
Primary or less	0,164	0,160	0,205
Secondary	0,512	0,506	0,582
Tertiary	0,324	0,334	0,213
Temporary contract	0,167	0,140	0,464
<i>Housing tenure</i>			
Owner without mortgage	0,453	0,486	0,082
Owner with mortgage	0,360	0,379	0,149
Renter	0,150	0,096	0,745
Free housing	0,018	0,019	0,013
Other type	0,019	0,020	0,011
<i>Type of transport</i>			
Public	0,454	0,435	0,671
Private	0,432	0,453	0,197
None	0,113	0,111	0,129
Other type	0,001	0,001	0,002

<i>Sector of activity</i>			
I1	0,005	0,004	0,012
I2	0,000	0,000	0,000
I3	0,012	0,012	0,010
I4	0,008	0,008	0,006
I5	0,024	0,026	0,009
I6	0,024	0,025	0,012
I7	0,069	0,073	0,033
I8	0,009	0,009	0,005
I9	0,085	0,075	0,197
I10	0,105	0,106	0,093
I11	0,050	0,043	0,126
I12	0,101	0,104	0,063
I13	0,057	0,060	0,022
I14	0,106	0,109	0,081
I15	0,129	0,139	0,025
I16	0,072	0,077	0,027
I17	0,095	0,099	0,049
I18	0,048	0,032	0,229

Table 3: Ordered logit for commuting times ¹²		
	Odds Ratio	t
<i>Nationality</i>		
EU(15)	0,941	-0,82
Other european countries	1,671	8,33
Africa	1,175	2,43
USA and Canada	1,043	0,2
South and Central America	1,060	1,73
Asia and Oceania	0,809	-2,12
Male	1,028	1,93
Reference person	1,093	6,22
<i>Age</i>		
16-24		
25-39	1,080	2,51
40-54	1,088	2,73
55-64	1,188	5,09
Married	1,016	0,88
<i>Household type</i>		
Single without children		
Couple without children	1,112	5,07
Single with children	0,980	-0,63
Couple with children	1,003	0,17
<i>Education</i>		
Primary or less		
Secondary	0,985	-0,82
Tertiary	1,052	2,32
Temporary contract	1,115	6,06
<i>Housing tenure</i>		

¹² A set of activity and *municipi* dummy variables have been included in the estimation.

Owner without mortgage		
Owner with mortgage	1,006	0,4
Renter	0,906	-4,5
Free housing	0,785	-5,14
Other type	0,932	-1,54
<i>Type of transport</i>		
Public		
Private	0,240	-98,5
None	0,020	-155,9
Other type	0,122	-12,46
N	86120	
Log Likelihood	-137104	