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On the Migration Decision of IT-Graduates:
A Two-Level Nested Logit Model

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ABSTRACT

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Discrete choice models are used to investigate the individual's choice among a discrete number of alternatives. The characteristics of each alternative, by means of a multinomial and nested multinomial models have been taken into account. Specifically, this study analyses the impact of choice specific characteristics (attributes) in a model of choice between different country locations. Individual IT-Graduates are assumed to choose a single type of move, stayhome or go-abroad, while simultaneously choosing a country of their choice. We demonstrate that a nested logit model is appropriate on both theoretical and empirical grounds. The sample consists of 1,500 IT-Graduates from Pakistan. The results show a high migration propensity for foreign destinations. While comparing the direct elasticities (at branch level) of home with the foreign destination types we observe that the economic factors such as self-employment and higher career position show greater effects than the socio-political as well as institutional factors (social networks and residence permit). A location comparison between the destinations Germany and USA/Canada (of the cross elasticities) shows that the magnitude of the values of elasticities are found to be higher for North American countries than for Germany. This suggests that IT-Graduates evaluate the factors self- employment, higher career positions, social networks and residence permit more important and significantly higher for North American destinations than for Germany. In addition we find a strong evidence for a competition between countries for high potentials from Pakistan.

ZUSAMMENFASSUNG

Migrationsentscheidung von IT-Hochschulabsolventen: Ein zweistufiges Nested-Logitmodell

Mit Hilfe von Modellen für diskrete abhängige Variablen untersuchen wir die individuelle Auswahl aus einer Anzahl von Alternativen bei der Migration. Die Charaktaristika der einzelnen Alternativen im Zusammenhang von Multinomial bzw. Nestedmodellen sind berücksichtigt worden. Wir untersuchen den Einfluss von auswahlspezifischen Charaktaristika in einem Modell zur Auswahl zwischen verschiedenen Empfängerländern. IT-Hochschulabsolventen wählen ausgehend von zwei Alternativmöglichkeiten (Migration oder im Land bleiben), eine Alternative aus und wählen simultan ein bestimmtes Land. Es zeigt sich, dass ein „Nestedlogit-modell" sowohl in theoretischer als auch in empirischer Hinsicht für die Untersuchung am besten geeignet ist. Die Stichprobe besteht aus ca. 1500 IT-Hochschulabsolventen aus Pakistan. Die Ergebnisse zeigen eine höhere Neigung auf, ein ausländisches Land zu wählen. Beim Vergleich der Direktelastizitäten für die erste Stufe beobacten wir für die Faktoren Selbstständigkeit und gute Karrieremöglichkiten einen höheren Einfluss als für die gesellschaftspolitische Determinaten (Soziale Netzwerke und Aufentshaltserlaubnis). Bei einem Standortvergleich zwischen Deutschland und dem klassischen Immigrationsland USA (basiert auf Kreuzelastizitäten) zeigt sich ferner, dass das Ausmaß der Elastisitätenwerte höher für Nordamerikanischen Länder ist als für Deutschland. Dies bedeutet, dass die ITHochschulabsolventen die Faktoren: die Selbstständigkeit, gute Karrieremöglichkeit, soziale Netzwerke und Aufenthaltserlaubnis für die Nordamerikanischen Länder signifikant höher bewerten als für Deutschland. Zusätzlich finden wir eine Evidenz für die Existenz von Wettbewerb zwischen Ländern für die IT-Hochschulabsolventen aus Pakistan.

1. Introduction

The starting point of current discussions about foreign immigration into Germany has been skill shortages on the German labour market. Particularly for specialists in information and telecommunications technology, the mismatch on the German labour market has now reached the critical point where it is actually inhibiting growth. Both the increasing worldwide competition for highly qualified specialists and managers and globalisation trends, in general have resulted in increased emigration of German skilled workers and, at the same time, create the need for greater immigration into growth markets. The problem has recently been attracting growing attention from actors in industry and commerce, public policy and politics (Unabhängige Kommission Zuwanderung, 2001). The demand for information technology (IT) specialists is particularly strong with respect to specific types of technical knowledge (e.g. programming languages) and special "international skills", such as opening up foreign product markets for companies and their partners.[1]

The most influential factors behind these trends are increasing globalisation and demographic changes. Stalker(2000) referred to the strong globalisation effect in connection with a heightened degree of labour mobility in the twenty-first century. Labour mobility — caused by growing pressure on the labour supply, increasing disparities in income between respective countries and, above all, the revolutionary development of information and communication technologies — will play an increasingly important role in the international dissemination of knowledge and technology. On the other hand, demographic changes over the last few decades have been leading to a population decline in Germany and are having unwelcomed side-effects on economic development and innovative capacity.

The consequences of these trends for Germany have become all too evident: more intense international competition for the most talented, a growing demand for well-qualified workers, an expansion of the markets, and a competitive disadvantage in the information and communication technology fields as a result of high wage costs.

Two main reasons are given for the shortage of specialists in Germany: first, the constantly changing state of the computer technology and its continued rapid growth worldwide, and, second, the failure of German universities and polytechnic colleges to provide workers with training that is adequately geared to the needs of the labour market. Therefore, in order

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[1]   According to the IZA International Employer Survey 2000 findings (IZA – Forschungsinstitut zur Zukunft der Arbeit [Institute for the Study of Labor], Bonn), for which 340 telephone interviews in Germany and 170 interviews each in France, the United Kingdom and the Netherlands were conducted (Winkelmann, 2001).

to roughly meet skill needs further training and retraining schemes for the available domestic labour force are necessary, as are efforts, already underway, to build up the number of students and graduates in these fields (Neugart, 2000).

This long-term labour shortage is considered to be the overall cause for the emergence of so-called migration flows. To solve this problem, the German Federal Government, in co-operation with industry and commerce, has now established a "Green Card Emergency Programme to Meet the Demand for IT-Specialists" (*Green Card Sofortprogramm zur Deckung des IT- Fachkräftebedarfs*: http://www.bma.bund.de/download/broschueren/a232.pdf) which enables such specialists from non-EU countries to work in Germany for up to five years. In view of the prevailing domestic labour market problems, economic migration was not a desirable option. Most do agree, however, that a selective migration policy would bring overall economic benefits to recruitment countries (Zimmermann, 1996).

Migration research shows that the scale of international migration will increase overall. Little, however, is known about the determinants of past and present migratory movements, in particular those of IT specialists and highly educated persons, who could generate such migration flows (Regets, 2001). Current discussions still focus on whether a selective policy would bring overall economic benefits. What is more, the topic of immigration itself seems to be a controversial matter in Germany, both socially and politically.

Particularly with regard to immigration from developing countries, no extensive empirical research has been carried out to date, which takes into consideration not only the economic and social aspects of migration but also the political and institutional factors. Vogler (1999) has analysed these factors using an aggregated panel data set of asylum-seekers who migrated from developing countries. A study by Fiedler (2000) deals with the question of the conditions for which highly qualified IT workers migrate from India to Germany. To conduct this study a questionnaire was used to interview 48 employees of an IT company: the results confirm the participants' willingness to migrate based on migration-specific factors.

Most empirical studies carried out thus far discuss in detail the question of which factors influence decisions to migrate. The aim of these studies is to ascertain the best strategy for the countries involved from a migration-policy perspective, in order to control economically motivated migratory movements. The data basis of such research is for the most part, official statistics with the use of various methodological approaches. These studies place an emphasis on immigrants who have completed the migration process, whereas those remaining in their native country are not included in such studies. In the current economic environment

the international labour market situation, as described above, requires a change in outlook: mutual mobility is desirable, especially in the case of high-tech workers.

The aim of this study is to ascertain, on the basis of information gained through surveys, the economic and socio-political attributes of the decision to migrate. While using discrete choice methods based on the elasticities, we empirically quantify the effects of these attributes. The analysis is on migration decisions by IT university students in Pakistan, just prior to the completion of their studies, as if they would migrate to Germany or some other high-wage country.[2] In addressing this question, we test existing theories from migration research and draw conclusions for the German case which pertain to the various decision factors.

In the second section of this paper we discuss several basic theoretical and empirical considerations from which the examined research hypotheses are derived. The survey data and the variables of the statistical analysis are then introduced. The fourth section presents both the descriptive findings and the test results from the discrete choice models. The final section discusses implications of the research results and provides an outlook for further planned research.

2. Theoretical and Empirical Considerations

According to Han (2000), migration is a complex process, which, as far as its emergence and development is concerned, is continually determined through a multiplicity of causes and factors. As a rule the causes triggering this process are a mixture of objectively compelling exogenous factors (e.g. company contacts or attraction through foreign research laboratories and resources) and subjectively justified decisions (e.g. good career opportunities, starting a family). A classic approach to explaining the complex and multicausal determinants of migration can be found in the theory of so-called push and pull factors.

Push factors (migration factors) comprise all those conditions of the migrants' country of origin that induce them to migrate or temporarily migrate, such as political or religious persecution, economic crises and international wars. Pull factors (factors that attract migrants) are those circumstances in the host country that motivate and encourage them to migrate. Factors that may attract migrants are, for example, political stability, a democratic social structure, economic prosperity, better education and wage/salary opportunities relative to those in one's own country. It is generally assumed that with modern information, and communication

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[2] After successful completion of this pilot study, other Asian countries and/or East European countries will be brought into the research project.

and transportation capabilities, push and pull factors are becoming ever more important to individual migration decisions. Gatzweiler (1975) pointed out that in the end every migration decision is the result of push factors from the source country and pull factors from the target country working together.

An array of approaches in the migration-theory literature aim to identify and explicate important determining factors for an individual's willingness to migrate or for aggregated migration flows. The starting point of most theoretical models attempting to explain individual migration decisions is the neo-classical approach. The majority of micro-economic models is based on this approach, which views migration as a form of investment that is worthwhile or "profitable" for some individuals, but not so for others. The human capital approach maintains that migration takes place when the cost directly incurred through it will be reimbursed or will "pay for itself" through higher income in the future. Because of unemployment and other economic and non-economic aspects, migration is often connected with financial and social risks. According to neo-classical models, possible reasons for the relatively low level of immigration from developing countries are a strong preference for one's present environment, high migration costs, poor labour market chances, great uncertainty and the hope that developments in one's native country might unexpectedly turn for the better.

Cobb-Clark and Crossley (2001) state the family investment hypothesis for Australia, which would only be empirically tenable for "traditional" families, and not for non-traditional families in which both partners, the husband and the wife, are gainfully employed. On the other hand, the new economy of migration challenges the central role of relative income differences, because it views this difference as only one important point among others with regard to the decision for or against migration.

There are considerations on the macro-economic level as well, which in the end can be traced back to a micro-economic foundation. Among these are demographic trends, self-selection of migrants, self-sustaining migration and institutional restrictions on migration. Demographic trends are quite important: higher population figures in the sending country lead to per se greater migration flows. With regard to the causes of self-sustaining migration, so-called network effects command the greatest attention. These result from the fact that, apart from the contacts amongst themselves, migrants above all, maintain good contact with their native country. Through this exchange of information, the information and migration costs go down for all future migrants. People who have migrated in the past help the next ones with assimilation in the receiving country and also help reduce psychological costs that may arise through separation from one's native country (Bauer, Epstein and Gang, 2000).

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The other approach is based on political as well as economic factors and holds that the cause is both the rapidly growing migration potential in developing countries in addition to the limited opportunities for immigration as a result of insufficient intake ability or a lack of receptiveness. Hence, when analysing migration flows the basic institutional conditions should also be taken into account (Vogler and Rotte, 2000).

Relative to the large number of theoretical approaches (cf. Borjas, 1994; Vogler, 1999), there are few empirical findings, particularly with regard to migration from developing countries. This is due, in part, to a lack of suitable or adequate data sets, in addition to the fact that no extensive national or international research has been carried out up to now. As well, there are hardly any studies available that analyse the determinants of international migration, which take into account not only the economic and social aspects of migration but also the political and institutional factors. Furthermore, very few of these studies deal with the question of why migrants, despite knowledge of the incentives, stay in their native country and do not emigrate.

An empirical study by Marr (1975) analysed migratory movements from the United States, the United Kingdom and Germany to Canada from 1950 - 1967. According to him, relatively better working conditions and higher income played a significant role as pull factors towards Canada. A different study by DeVoretz and Maki (1983) examined the migration of highly qualified workers from 16 developing countries to Canada 1968 -1973. They found that occupation-specific employment opportunities were much more important for well-qualified workers than earnings opportunities. In contrast, Greenwood and McDowell (1991) gave differences in income as the most important push factor.

An empirical study by Zimmermann (1994) examined asylum-related emigration from four major regions — Africa, Asia, Eastern Europe and the Middle East — to the European Union during the years 1983–1992. He found that the level of unemployment in the individual countries had the expected negative impact on immigration, whereas the size of the respective labour market and the level of its relative wages exerted a positive influence. Huang (1987) chose to focus on the migration of well-educated workers from 1962–1976. The estimates reveal the expected influence that the respective wage differentials would have on a stay in the United States (i.e. push factor). Fleischer (1963) studied migration from Puerto Rico to the United States and found that, here too, economic opportunities proved to be the most significant influence for migration across national borders.

Whereas the research discussed up to this point is based on the analysis of cross-sectional or longitudinal data, Vogler (1999) made use of a panel data set for his analysis of

migration to Germany. It covers information on migration from 86 source countries for the period 1981–1995, including the number of asylum-seekers for the years 1984–1995. According to Vogler's findings, the decision of an individual to migrate from a developing country to an industrialised nation can be interpreted as an investment. In making this decision the potential migrant compares the future income in his or her native country with that of the target region and also takes into consideration the costs associated with migration. Other factors to be taken into account include unemployment, social services and taxes, both in one's native country and in the country of destination (i.e. push and pull factors).

The German Economic Institute in Cologne (Institut der deutschen Wirtschaft Köln (2001) has investigated companies' and IT specialists' previous experiences with the German Greencard. The study found that most of the reasons for taking up work in Germany were of an economic nature. First and foremost, it is especially important for almost all foreign specialists that they be given the opportunity to do "interesting work" in Germany. Foreign IT specialists next rank the advanced vocational training offered in second place. Good career and advancement opportunities are given as the next reasons for a stay in Germany.

Bartel (1989) studied the migration behaviour of different groups of migrants (Asians, Europeans and Hispanics) to the United States in 1980. His research shows that the network effects are very strong. Regions with a high number of residents belonging to a particular ethnic group are the preferred destination of migrants of that respective group. In both their micro-economic and macro-economic studies, Bauer and Zimmermann (1995) found a high level of significance for network effects on migration. In a recent study Bauer, Epstein and Gang (2000) examined the influence of a migration network on migrants' decisions based on location. They observed that the size of the Mexican network within the United States has a positive effect on the likelihood of migration.

From the perspective of the receiving country, there are essentially two types of studies on the differences in income between native residents and immigrants. Studies following the approaches of Chiswick (1978) and Borjas (1987) find an initial income disadvantage for immigrants when compared to native residents who are of the same sex, educational level and age and who work in the same industrial sector. However, according to their findings, the situation improves over time, and a gradual equalisation of earned income takes place. Other studies using the traditional decomposition method to calculate differences in income associate the unexplained remainder of differences in income between native residents and immigrants with statistical discrimination. Recently, Nielsen, Rosholm, Smith and Husted (2001) have attributed comparable orders of magnitude of income differences, to a deficiency in

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qualifications and work experience as well as incomplete assimilation. An OECD (2000) study found that skilled people move abroad in response to economic opportunities which are better than those available at home, as well as in response to the migration policies in the destination countries.

A good deal of the public discussion, however, revolves around the fear, not yet empirically researched, that a German Greencard might give rise to entire waves of immigration comparable both to the recruitment of migrants in the 1950s and 1960s and to the consequences for the present form of the social system for first and even second generations migrants (Fertig and Schmid, 2001). The PISA Study's findings for Germany point to further pressure still surfacing with third generation immigrants. To bring more objectivity to this discussion, we have chosen to contribute new empirical results, which were gathered directly from a highly mobile group of IT specialists in an important potential source country. In this way one can speak of an ascertainment of an "upper benchmark" for potential migration from any one source country.

3. Survey Data and Description of Variables

This study is based on a personal survey[3] of university information and communications technology students in their final year of study in Pakistan. To obtain representative data a total of 40 universities and other institutions with IT courses were contacted in the spring and summer of 2001. These particular institutions were chosen according to an established and widely accepted Pakistani college ranking system. The sample was drawn from the first, second, and third best institutions. In the end, twenty-five IT institutions participated in the survey. Letters to the appropriate professors explained that a foreign organisation wished to carry out research on the topic of international labour mobility of university graduates. This organisation's origin was not mentioned in order to avoid a country-specific bias in the results.

Consistent with the survey design of this study, the university students were only questioned about their expectations for the future relating to possible migration decisions during this first stage of research. The students were information technology and electrical engineering students in their final academic year of a master's and bachelor's programme and, hence, possessed to the highest academic education equivalent to that of academically trained German engineers. In order to analyse actual immigration to Germany and other industrialised

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[3] Survey data on migration intentions see, Burda, et. al. (1998), Liebig and Sousa-Poza (2004) and Mayda (2004).

countries, we will make a second survey one year later to again interview both the graduates who migrated and those who remained in their native country. This step will enable us to compare their previous intentions to migrate with their actual decision.

3.1. Questionnaire Design: Push and Pull Factors

The questionnaire has four main sections. In the first section, the students are questioned only about their personal characteristics. In the next section, they are only asked about individual determinants that might influence their migration decisions. In the third section, the students are asked to rank a number of alternative countries according to their preference. In the final section they are to explicitly assess, taking into account both the respective country and the importance of the various determinants, whether or not they might migrate to a particular country.

The relevant aspects to individual migration decisions are determined on the basis of general theories on migration behaviour, empirical research results and motives for migration already named in surveys. However, it would go beyond the scope of this project to take into account all possible push and pull factors. For this reason the analysis has been restricted to the most important factors, which are briefly presented below.

3.2. Social Networks, Chain Migration

We start with the assumption that before a person makes a decision to migrate he or she makes a comparison of possible destinations, a task that requires relevant information about the sending and the receiving country. This information may come from different sources, such as various media and information agencies that deal with the systematic recruitment of labour, and private information channels (Feithen, 1985).

Whereas knowledge about the determinants of the sending country is based mainly on one's own experiences, information about the receiving country can only be gathered through external sources (Gatzweiler,1975). Personal relationships to relatives and friends are of utmost importance in obtaining such information (Feithen, 1985). The dominance of private information channels can be explained by the fact that the weight of social and emotional bonds can outweigh other factors when making a migration decision. Treibel (1999) has argued that one cannot always assess reliability of such information. This circumstance also helps explain the so-called chain migration phenomenon, which is the larger subsequent migration flows of people who have been informed by previous migrants (Han, 2000). Networks with continuing obligations and expectations may arise through the use of such personal rela-

tionships. The migrant networks resulting from this process help reduce risks and uncertainties by supplying valuable information (Faist, 1997). The relatively pronounced mobility of highly qualified workers can also be understood in this context: Because they have a comparatively high level of information available to them as well as a wide job-search range open to them, they often find it easier to migrate than do workers with average skills and education (Janssen, 1998).

3.3. Career/Self-employment Opportunities and Improved Professional and Social Status

In principle, improvement of professional status can be grouped with the improvement of social status as one reason for migration, because the latter usually follows from the former as a result of an increase in income (Feithen, 1985). One push factor related to such professional concerns is the lack of advancement opportunities in those sending countries characterised as developing countries. In comparison, there is an opportunity to make gains in professional and social status through migration to developed countries (Blahusch, 1992). One pull factor is the possibility for relatively better on the job training/advanced vocational training in industrialised countries. According to Schipulle (1973), since highly qualified people have an especially strong desire to improve their status, it is hardly surprising that they often name professional career planning as a motive for migration (Körner, 1999).

3.4. Salary/Income Situation and Standard of Living

One complaint of highly qualified workers in sending countries relates to the poor wages received. This aspect represents an important push factor (Körner, 1999), whereas higher income in industrialised countries functions as a pull factor (Blahusch, 1992). The comparatively low income in their countries of origin, in contrast to the high income in industrialised countries together result in another cause of migration (Breidenbach, 1982). According to Schipulle (1973), as a rule, the difference in income between the developing and the industrialised country must be exceptionally large in order to induce migration. What is more, income frequently symbolises a person's standing and abilities and, as such, represents a measure of his or her accomplishments and success. A high income also leads to more respect within one's social sphere (e.g. standard of living).

3.5. Hostility Towards Foreigners

Social distance, which can lead to hostility towards foreigners in the receiving country, hinders migration (Gatzweiler, 1975). Through the rise of prejudices against foreigners, xenophobia can be found time and again in alarming situations for the economy, society, politics and culture (Bade, 1994). Such a situation in the target country deters potential migrants, who fear that they might come to harm during their stay abroad (Thelen, 2000).

3.6. Language/Culture

Fischer and Straubhaar (1998) were the first to describe the value of immobility in a systematic way by drawing from several new hypotheses. They argue that some skills and part of one's abilities are location-specific. These internal, country-specific advantages are not just of an economic nature; rather, they are culturally, linguistically, socially and politically binding factors. The effect of these factors and of one's native country on migration is like that of a "push factor" preceded by a minus sign. In addition, they deal with advantages specific to particular businesses, regions and societies.

When the languages of the sending and receiving countries differ, language barriers arise, resulting in a smaller probability of migration (Feithen,1985). Because mobility depends considerably on an individual's language abilities, which in a figurative sense reflect one's ability to integrate (Körner, 1999), highly qualified people tend to exhibit a relatively high probability of migration because of the additional linguistic proficiencies they often possess (Janssen, 1998).

3.7. Duration of Stay

The permitted duration of stay in a receiving country is an important institutionally defined determining factor. The different immigration laws of countries can work to discourage or attract migrants. The United States, as the classic immigration country, is a good example of a pull factor in this regard, whereas Germany, with its non-immigration policies, can be considered a push factor. If migrants take this institutional factor into consideration in their decision-making process, the likelihood of migration may decrease.

4. Model Specification and Estimation

A discrete choice analysis is used to model the choice of one among a set of mutually exclusive alternatives. The multinomial conditional logit model (MCLM) (McFadden, 1973), the

most widely used discrete choice model, is based on the principle of utility maximization and has the advantages of a simple mathematical structure and ease of estimation.

However, it has the property that the relative probabilities of each pair of alternatives are independent of the presence or characteristics of all other alternatives. This property, known as the independence of irrelevant alternatives (IIA) implies that the introduction or improvement of any alternative will have the same proportional impact on the probability of every other alternative. This representation of choice behaviour will result in biased estimates and incorrect predictions in cases, which violate the IIA property, i.e some probabilities may be under- or overestimated.

The most widely known relaxation of the MCLM model is the nested logit model (NLM), which allows the pairs of alternatives in a common group to be independent of each other (Ben-Akiva and Lerman, 1985; McFadden, 1978).

We first motivate the multinomial conditional logit model by a random utility model (Maddala,1983, p59-61; Greene, 2003, pp).

The multinomial conditional logit model allows for an individual's utility of an alternative to be based upon the characteristics of that alternative. Thus, the *ith* individual's utility of the *jth* alternative will be given by:

$$U \text{ (choice } j \text{ for individual } i) = U_{ij} = \beta X_{ij} + \varepsilon_{ij} \text{ .}$$

Where X_{ij} indicates a variable measuring the characteristics of alternative *j* relative to individual *i* and represent a matrix of individual-specific independent variables. The individual random specific terms, $(\varepsilon_{1i}, \varepsilon_{2i}, \ldots, \varepsilon_{ji})$, are assumed to be independently distributed, each with an extreme value(Gumbel) distribution.

Under these assumptions, the probability that an individual *i* choose alternative *j* is:

$$P_{ij} = \Pr (U_{ij} > U_{ik}) \quad \text{for all} \quad k \neq j \text{ .}$$

The choice probabilities for the *ith* individual are:

$$P_{ij} = \exp(Z_i \alpha_j) / \sum_{k=1}^{J} \exp (Z_i \alpha_k) \quad \text{or } k = 1, 2, \ldots, J.$$

According to Cramer (1991), a conditional logit model contains regressors that take different values for each alternative location. The attributes contained in the vector Z vary with both *i* and *j*. The coefficient is common to Z. The parameter α implies that the attribute similarly affect the utility of all destinations, because an attribute is assumed to influence the utility similarly across all locations.

According to Hoffman and Duncan (1988), the general form of the conditional logit model can be rewritten in the form

$$P_{ij=1} / \sum_{k=1}^{j} \exp\left(Z_{ik} - Z_{ij}\right) \alpha .$$

We can see that P_{ij} depends on the difference in the characteristics common to the alternative destinations. Variables that do not vary according to ones choice, such as an individual's age can be included via the use of choice-specific interaction terms.

5. The Nested Logit Model

We justify the nested formulation of the model mainly, because we suspect that the expected utilities associated with the unobserved destinations' choices can be correlated, which is a violation of the independence of irrelevant alternatives (IIV) assumption (see above). If an individual perceive the destination alternatives as close substitutes, for example, if Go-Abroad migrants perceive the attributes of Germany and USA/Canada as similar, then the unobserved factors that affect one destination may also affect another, because the utility is no longer stochastically independent but is correlated through the error terms across those alternatives. See Greene (2003) and Knapp, et. al. (2001) for a complete discussion.

Secondly, we also think that some of the factors (push and pull) that influence home or foreign destination type are distinct and by being jointly modeling the two can be revealed. For example, mobility for some individuals may occur because the destination attributes that maximize the utility (higher salary, established social networks, incentives for high-career position, possibility of entrepreneurship etc.) are less attractive for the home destination and are more attractive for a foreign destination, i.e. the individuals may choose another utility maximizing destination type of move, which can be thought of as distinctly different. But the destination decision can't be made independently of the features of alternative locations (destination).

Thirdly, the nested model offers researchers a method of linking the choice of destination with the type of move (Stay-Home or Go-Abroad) and captures any feedback between the two simultaneously determined decisions. Furthermore, decomposition of direct and cross elasticities into branch (upper-level) and choice (lower-level) between destination (Pakistan, Germany, etc.) effects can be estimated.

Consider now the problem of <u>choice of country location</u>. Suppose that an individual faces such a problem with a choice of Stay-Home or Go-Abroad indexed as $i = 1,2$ (upper level) and countries choice mode $j = 1,2,\ldots,N_i$ (lower level).

Our formal model of the two-level nested logit model as demonstrated by Greene (2003) and modified to our specification is

$$\Pr[\text{choice } j, \text{branch } i] = P_{j|i} * P_i ,$$

where i refers to the type of move (Stay-Home or Go-Abroad) and j refers to the destination choices (Pakistan, Germany, etc.)

The conditional probability $P_{j|i}$ can be defined as:

$$P_{j|i} = \exp(\beta X_{j|i}) / \sum_{j=1}^{Ji} \exp(\beta X_{j|i}) ,$$

and the marginal probability as P_i:

$$P_i = \exp(\gamma Z_i + \tau I_i) / \sum_{i=1}^{I} \exp(\gamma Z_i + \tau I_i),$$

We define an inclusive value I_i (link function between the two levels) for the *ith* branch as:

$$I_i = \ln \sum_{j=1}^{Ji} \exp(\beta X_{j|i}) ,$$

where, x refers to the attributes of destination locations and z refers to the characteristics of the type of move. The term I_i is the inclusive value and the parameter τ is a measure of the correlation among the random error terms due to unobserved attributes of destination choices and is used as a test for random utility maximization in nested logit model. The expression τI_i captures the feedback between the lower level (destination choice) and upper level (type of move) of the model.

The parameters α, β, and γ are then estimated using FIML simultaneous estimation. The model is consistent with utility maximization if the conditions, $0 < I_i \leq 1$, are satisfied. If $I_i = 1$, the nested model collapses to the MCNL.

Full information maximum likelihood (FIML) method of nested logit model estimates all of parameters simultaneously[4] by maximizing the unconditional log-likelihood;

$$\text{Log-L} = \Sigma \log P(j|i) + \log P(i) .$$

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[4]   An alternative way to fit a special case of the model is by sequential or two step estimation.

6. Empirical Part

Mahmood and Schömann (2003) recently investigated how an individual's expectations to migrate pertaining to economic and socio-political factors vary between several alternative destinations. The IT-graduates viewed the North American countries (United States and Canada) as their first choice in every respect. Furthermore, a relatively high willingness, in general, to migrate to industrialised countries was found.
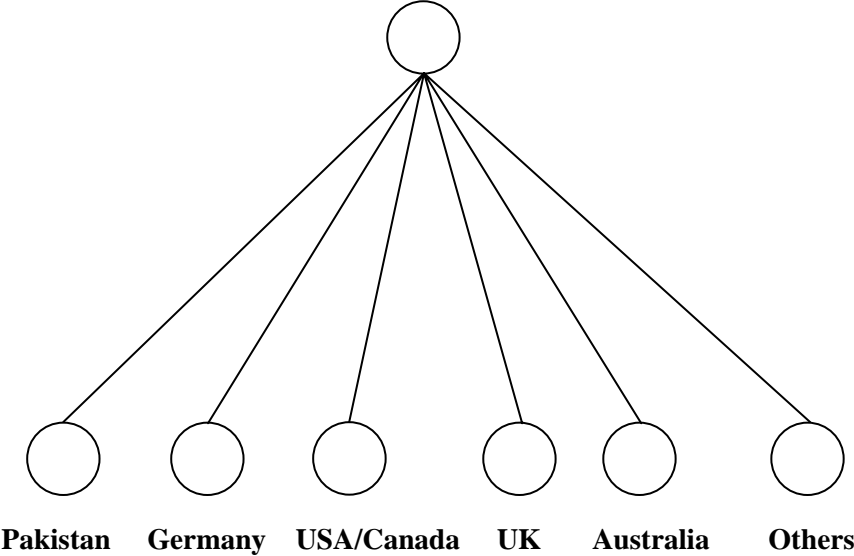
In addition, the economic aspects such as career opportunities, salary and standard of living were for potential migrants the most decisive factors for an attractive location. Self-employment opportunities represented a positive factor for Germany in comparison to the other options considered here. On the other hand, Germany was the only country for which tolerance towards foreigners was not viewed as the least important criterion. Overall, however, this criterion is not considered to be very important. In the previous study the quantification effects of the determinants or elasticities were not estimated. In this study we use discrete choice econometric techniques to estimate the effects from direct and cross elasticities.

Figure 1a illustrates a single level destination choice diagram, whereas figure 1b shows the model's nesting feature for the individual choices. The tree structure shown is not intended to represent a sequential behavioural model of migration, but rather, we assume that a migrant makes a simultaneous decision regarding country (destination choice) and the type of move. A sequential model structure is not adopted because the decision making process is not known priori. For analytical purposes, the destination (country choice) decision is broken into two types of moves: Stay-Home or Go-Abroad. There are six potential country destinations (Pakistan, Germany, USA/Canada, United Kingdom, Australia and Others (Arabian Gulf countries put together).
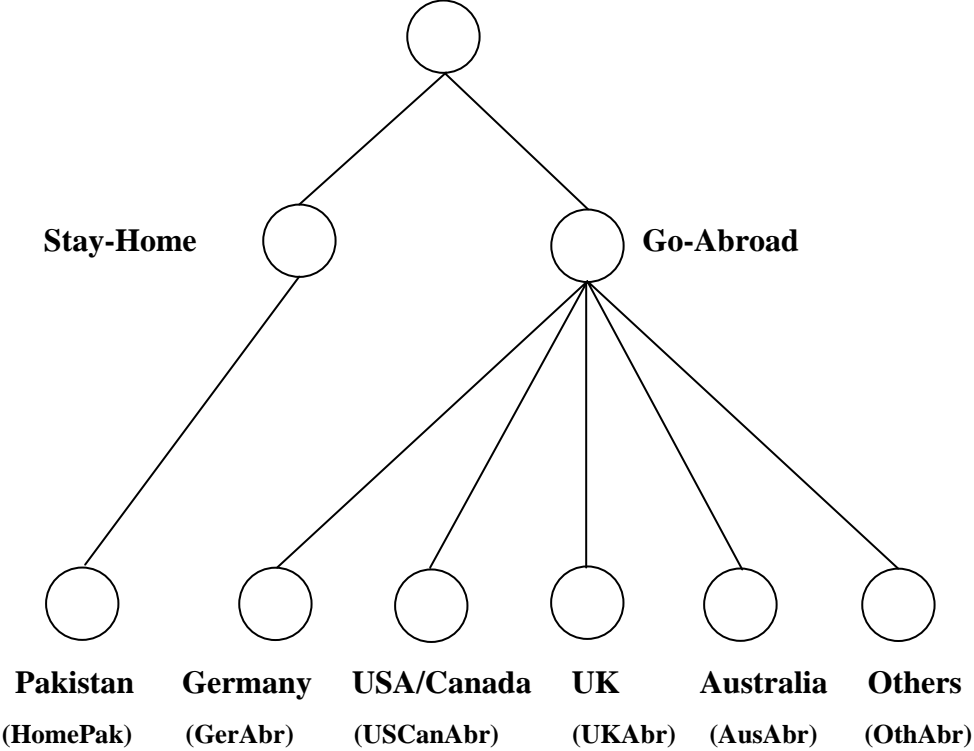
According to Forinash and Koppelman (1998), the multinomial conditional (MCLM) and nested logit models (NLM) can each be depicted by a tree structure that represents all the alternatives. The multinomial logit model treats all alternatives equally, whereas the nested logit model includes intermediate branches that group alternatives (figure 1b). The grouping of alternatives indicates the degree of sensitivity (cross-elasticity) among the alternatives. Alternatives in a common nest show the same degree of increased sensitivity compared to alternatives not in the nest. NLM provides a more general structure than the multinomial conditional logit model. Structural difference can result in dramatically different mode projections and diversions than those obtained by the MCLM in cases where the NLM is significantly different from the MCLM model.

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Figures <u>1a and 1b</u>: Nesting Model Structure (simultaneous decision-making process)

<u>Figure 1a:</u> A One-Level Decision Tree

Pakistan   Germany   USA/Canada   UK   Australia   Others

<u>Figure 1b:</u> A Two-Level Decision Tree

Stay-Home   Go-Abroad

Pakistan   Germany   USA/Canada   UK   Australia   Others

(HomePak)   (GerAbr)   (USCanAbr)   (UKAbr)   (AusAbr)   (OthAbr)

The choice set includes six destination country modes; Pakistan, Germany, USA/Canada, Australia, United Kingdom and Others (Arabian Gulf Countries). The distribution of choices in the data set is: Pakistan (241; 17.35%), Australia (54; 3.89%), Germany (131; 9.43), United Kingdom (89; 6.41%), USA/Canada (793; 57.09%) and others (81; 5.83%).

Table 1 shows the estimates of the multinomial conditional and the nested logit models of the destination mode choice example. Our dependent variable is a destination choice and includes six alternatives; Pakistan, Germany, USA/Canada, United Kingdom, Australia and Others. The explanatory variables (social networks, residence permit, language/culture, and racial acceptance) should reflect the impact of socio-political and institutional factors whereas high-career position, self-employment, standard of living and salary reflect the economic importance. Pakistan is chosen as the reference outcome.

The alternative-specific constant for an alternative has been included in the model to capture the average effect on utility of all factors that are not included in the model. (Train, 2002). From the second column of the table we see that the constant's coefficients are statistically significant except for GER_Const. This suggests that the utility (or probabilities) of the individuals for all alternatives relative to the alternative Pakistan decreases for all alternatives. This explains the average effect on the utility fairly well for unincluded factors in the model. The decision to move is also conditional based on age and gender, which can be seen by the coefficients. People in the age group of 20-25 are more(less) likely to migrate than those of other groups. Even the coefficient is statistically insignificant as well females are less likely to migrate than males.

The coefficients of the variables should show the utility of each individual for the chosen alternative, which either reduces or increases at the rate according to the value of the coefficient, either negative or positive, the change of the variable measured, the individual and for the alternative. Based on the t-statistics we see from the first column of the table that all coefficients are statistically significant with the exception of salary and standard of living. Salary depicts a negative sign indicating that the importance of this variable decreases the probability of choosing a destination other than the home destination. According to the magnitude of the coefficients, the order of the coefficients corresponds to the order of the marginal effects of the choice probabilities. Almost all variables are highly and significantly positive (except standard of living and salary). This suggests that the probability of choosing any destination mode decreases as the importance of these attributes decreases.

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Table 1: Estimated Results of MCLM and NLM Models

Parameter Estimates (T-statistics in paranthesis)

Explanatory Variables	MCLM	Nested Logit Model (NLM)
USA/CAN_Const	-1.18297	2.1071
	(10.219)***	(14.218)***
GER_Const	-0.18838	0.7894
	(-1.716)*	(4.299)***
UK_Const	-0.92052	0.0267
	(-5.283)***	(0.135)
AUS_Const	-1.08584	-0.1100
	(-5.389)***	(-0.492)
OTHERS_Const	-0.90150	— —
	(-5.393)***	
Age_Dummy	0.01341	0.0037
	(1.108)	(1.152)
Male_Dummy	-0.32129	-1.0651
	(-1.132)	(-1.109)
Social Networks	0.18780	0.2125
	(5.547)***	(4.698)***
Residence Permit	0.14856	0.1415
	(4.205)***	(2.794)**
Language/Culture	0.11505	0.1369
	(3.359)***	(3.082)***
Racial Acceptance	0.10269	0.1007
	(2.679)**	(1.937)**
Higher Career Position	0.16376	0.1900
	(3.062)***	(2.695)**
Self-employment	0.12798	0.2892
	(2.782)**	(4.463)***
Standard of Living	0.03717	0.0384
	(0.938)	(0.663)
Salary	-0.0283	-0.0289
	(-0.514)	(-0.396)
Inclusive Value Parameter		
Stay-Home	— —	0.3608
		(1.956)**
Go-Abroad	— —	0.7304
		(3.944)***
R^2-Adj.	0.313	0.515
Log of likelihood	-1042.85	-1739.01

*** significant at 1 percent level
** significant at 5 percent level
* significant at 10 percent level

From column 3 of table 1, we see (results of the NLM) that except for the variable salary and standard of living, all other t-statistics are larger than the critical value. The strongest effect can be observed for the variable social networks followed by residence permit, language/culture, high-career positions and self-employment. The Adjusted R^2 shows a correct prediction of 31 percent for the conditional logit model and around 51 percent for the nested logit model. While the signs and coefficient's significance of the nested models have a standard interpretation (the same for the MCLM), the magnitude of the coefficients do not. To help interpret these results, table 2 report the attribute's direct and cross elasticities effects for making a choice between the alternatives.

7. Direct and Cross Elasticities of the Nested Logit Model

In this section we derive the direct and cross elasticities from the nested logit models and use them to interpret the attribute's role in the individual's choice of destination. We compare the direct and cross elasticities of probabilities with respect to the attribute's changes for any alternative. The full information maximum likelihood (FIML) results were computed using the NLOGIT module of LIMDEP, version 7. The perceived utility underlying the migration decision depends not only on personal factors but also on ecological variables, representing the economic, cultural, institutional and political characteristics of the destination countries. The specification and selection of personal factors and ecological variables within the models are guided by previous research results, substantive theories, and the desire to avoid collinearity among the explanatory variables.

A parsimonious model structure with respect to personal characteristics has been adopted. Personal characteristics do not vary across choices, therefore the method for including them in the MCLM and nested logit model is through interaction terms, which involves interacting a choice-specific dummy variable with each personal characteristic. We interacted personal characteristics based on our own judgement with home, because "home" is a degenerate branch. If the estimation procedure includes too many interacted dummy variables, the model becomes over-determined and singularity may occur, see Greene (2003). Therefore our personal variables are restricted only to age and gender. The estimates of the nested logit model are described in table 1.

According to Bhat (1998), the difference in sensitivity among the MCLM and NLM suggests the need to apply formal statistical tests (conventional likelihood ratio tests) in order to determine the structure that would be most consistent with the data. Hausman and McFad-

den (1984) proposed a specification test to test the inherent assumption of irrelevant alternatives (IIA) independence. His model was then tested for IIA properties using Hausmann and McFadden's (1984) specification test. The model showed chi-squared statistics with significance values 170.9 > 16.9 suggesting there was a very serious problem and that a nesting structure ought to be applied to the model.

Another test of the nesting structure specification is from the McFadden condition which holds that the parameters of the inclusive values lies within the 0,1 interval. The coefficients on the inclusive value parameter are 0.36 and 0.73, respectively. A two-tailed t-test at the 99 percent confidence level suggests that this parameter estimate is significantly different from zero and one. In other words there are unobserved similarities between the choice destinations. By these measures, our nested logit model is for these data an appropriate characterization of individual's decision to migrate.

Table 2-(a-d) depict the nested logit model's values for direct and cross elasticities. We use abbreviated expressions to describe the destination types HomePak (Pakistan), GerAbr (Germany), USCanAbr (US/Canada) and UKAbr (United Kingdom). In the following we present only selected elasticities for the destinations HomePak, GerAbr, USCanAbr and UKAbr, because these countries are considered to be the most interesting locations for migrants. Remaining estimated direct and cross elasticities for other countries are not reported here.

A *direct elasticity* of HomePak measures the impact of a percentage change in an attribute of origin Pakistan on the probability of choosing the home destination. A *cross elasticity* for HomePak measures the impact of a percentage change in an attribute of the origin Pakistan on the probability of choosing among one of the alternative foreign destinations (GerAbr, USCanAbr, and UKAbr).

If a sign on the direct elasticity of an attribute is positive, then the locational features are an attractive attribute for the home destination. The cross elasticity's negative sign shows that the home features are attractive to retain potential migrants in their home country.

The direct and cross elasticities for the HomePak choice are limited to the branch level (Stay-Home, Go-Abroad; see figure 1b), because the HomePak decision terminates at the branch level (i.e., with only a single alternative). The choices GerAbr, USCanAbr and UKAbr include both upper and lower level effects. The upper-level direct and cross elasticities measure the contribution of an attribute to the probability of selecting a particular type of move (Stay-Home, Go-Abroad). The direct and cross elasticities for the lower-level measures both the effects of branch (upper-level) and choice (lower-level).

The direct and cross elasticities for HomePak, GerAbr, USCanAbr, UKAbr for the lower-level attributes (social networks, language/culture, residence permit, racial acceptance) should reflect the socio-political impact, whereas self employment, higher career position, standard of living and salary reflect the economic significance. All the estimated values for these variables include both branch and choice effects.

The branch contribution (table 2b) compared to the total elasticity takes on the same values for both the GerAbr direct elasticity and the cross elasticity with USCanAbr, because the branch effect (column 2 of table 2b) captures the impact of a change in the attribute of GerAbr destination on the probability of choosing a Go-Abroad move. Elasticity's choice component (column 3 and 6) measures the impact of a change in an attribute of GerAbr destination on the probability of choosing a destination (for a direct elasticity) or another destination in the same nest (for a cross elasticity). Therefore, the choice components of the direct and cross elasticities vary. Similarly, the lower-level direct and cross elasticities for USCanAbr (table 2c) include both branch and choice effects. The branch contribution of total elasticity takes on the same values for both the USCanAbr direct elasticity and the cross elasticity with GerAbr, because the branch effect captures the effect of a change in the attribute of the USCanAbr destination on the probability of choosing a Go-Abroad move.

Elasticity's choice component (column 3 and 6) measures the impact of a change in the attribute of USCanAbr on the probability of choosing this destination (for the direct elasticity) or any of the other foreign destinations (for the cross elasticity). The direct and cross elasticities at the choice level vary, whereas the cross elasticities of USCanAbr and GerAbr with HomePak are entirely captured at the branch level, because HomePak is a degenerate branch (i.e., with only a single alternative).

The branch and choice components of the direct elasticities for GerAbr and USCanAbr show disaggregated pull effects of the site attribute. The branch component of the direct elasticity measures the pull from the origin Pakistan if the sign is positive. If the choice component of the direct elasticity is positive, then the attribute is a pull to the specific USCanAbr or GerAbr destination type.

The cross elasticities USCanAbr and GerAbr with HomePak identify a pull to either GerAbr or USCanAbr destination types if the sign is negative. The branch component of the cross elasticities of either Go-Abroad choices show a pull to the location other than the origin Pakistan if the sign is positive. If the sign on the choice component of the cross elasticities is negative, the attribute is then a pull feature of the specific destination relative to the alternative destination type.

The upper part of the (table 2a) depicts the direct and cross elasticities for the destination HomePak, which are ranked within the groups of socio-political, institutional and economic attributes in descending order of importance. The direct and cross elasticities for all attributes in the table have expected signs, except for the two attributes racial acceptance and salary.

While comparing the direct and cross elasticities for the choice HomePak (table 2a), among the socio-political and instituitional variables, social networks tends to show the strongest effect, having the greatest influence as an attractive feature of the HomePak choice. In other words, if the importance of this attribute, social network, in the home country would be increased by one percent, than the probability of staying at home increases by a value of 0.315.

On the other hand, cross elasticity shows that the probability for moving to another country tends to decrease by a value of –0.063, if the importance of social networks in Pakistan is raised by one percent. Both the language/culture variables as well as residence permit show positive values which indicate that this is an attractive feature for the HomePak choice. In contrast, we observe from the table that the value of the direct elasticity of the attribute racial acceptance is found to be positive with a value of 0.118, indicating that the probability to stay in Pakistan would increase, which is quite obvious.

Now comparing the elasticities of the economic attributes for HomePak choice we see, based on the magnitude of the elasticities, that self-employment (0.403) and high-career position (0.325) tend to show the strongest effect followed by standard of living for the home destination. Finally, against our expectations, salary is found to be a less attractive attribute for the HomePak destination. This suggests that the probability would decrease for the choice HomePak, if the importance of salary is increased by one percent. The value of the cross elasticity is 0.010, which shows that the probability of moving to any foreign country would increase and would be expected.

Now we compare the direct elasticities on HomePak with the branch component of GerAbr and USCanAbr (table 2-b&c, column 2). We can see from the table that the socio-political and economic attributes as pull factors are less important in the decision to select a destination type other than HomePak. The branch component of the direct elasticities for Go-Abroad move types are small relative to the choice effects, which suggests that attributes of the socio-political factors as well as the attributes of economic nature are more important as pull factors in selecting a specific Go-Abroad move type. Now if we compare the total direct elasticities for the Go-Abroad destinations (table 2-b&c, column 4), the branch components

Table 2: Direct and Cross Elasticities of Nested Logit Model

a)	Direct Elasticity for HomePak	Cross Elasticity for HomePak with Go-Abroad
Socio-Political Attributes	Total	Total
Social Networks	0.315	-0.063
Language/Culture	0.178	-0.035
Residence Permit	0.170	-0.031
Racial Acceptance	0.118	-0.021
Economic Attributes		
Self-employment	0.403	-0.080
Higher Career Position	0.325	-0.062
Standard of Living	0.053	-0.010
Salary	-0.051	0.010

b)	Direct Elasticity for GerAbr			Cross Elasticity for GerAbr with USCanAbr and HomePak		
	Branch	Choice	Total	Branch	Choice	Total
Social Networks	0.011	0.599	0.609	0.011	-0.069	-0.085 (-0.060)*
Residence Permit	0.008	0.515	0.523	0.008	-0.079	-0.071 (-0.050)
Language/Culture	0.008	0.422	0.430	0.008	-0.067	-0.059 (-0.041)
Racial Acceptance	0.005	0.308	0.313	0.005	-0.045	-0.040 (0.028)
Self-employment	0.020	1.187	1.207	0.020	-0.176	-0.156 (-0.108)
Higher Career Position	0.017	0.998	1.014	0.017	-0.142	-0.125 (-0.089)
Standard of Living	0.002	0.157	0.160	0.002	-0.023	-0.021 (-0.014)
Salary	-0.003	-0.148	-0.150	-0.003	0.021	0.018 (0.013)

* In parentheses are the cross elasticities for HomePak destination.

c)	Direct Elasticity for USCanAbr			Cross Elasticity for USCanAbr with GerAbr and HomePak		
	Branch	Choice	Total	Branch	Choice	Total
Social Networks	0.060	0.271	0.331	0.060	-0.651	-0.591 (-0.415)*
Residence Permit	0.045	0.220	0.265	0.045	-0.504	-0.459 (-0.323)
Language/Culture	0.041	0.184	0.225	0.041	-0.428	-0.387 (-0.272)
Racial Acceptance	0.025	0.121	0.146	0.025	-0.264	- 0.240 (0.169)
Self-employment	0.101	0.473	0.574	0.101	-1.064	-0.963 (-0.676)
Higher Career Position	0.086	0.382	0.468	0.086	-0.828	-0.743 (-0.519)
Standard of Living	0.060	0.271	0.331	0.060	-0.651	-0.125 (-0.088)
Salary	0.045	0.220	0.265	0.045	-0.504	0.110 (0.077)

d)	Direct Elasticity for UKAbr			Cross Elasticity for UKAbr with Go-Abroad Destinations & HomePak		
	Branch	Choice	Total	Branch	Choice	Total
Social Networks	0.007	0.757	0.763	0.007	-0.066	-0.059 (-0.041)*
Residence Permit	0.005	0.609	0.614	0.005	-0.050	-0.045 (-0.032)
Language/Culture	0.005	0.539	0.544	0.005	-0.045	-0.040 (-0.028)
Racial Acceptance	0.003	0.350	0.353	0.003	-0.350	-0.024 (0.017)
Self-employment	0.011	1.323	1.334	0.011	-0.108	-0.097 (-0.067)
Higher Career Position	0.009	1.079	1.088	0.009	-0.086	-0.076 (-0.053)
Standard of Living	0.001	0.176	0.178	0.001	-0.014	-0.013 (-0.009)
Salary	-0.001	0.013	-0.163	-0.001	0.013	0.011 (0.008)

are found to be greater for the USCanAbr category; however, the choice components are greater for GerAbr category. This suggests that the individuals are more responsive to the attributes of the USCanAbr destination type in their decision to leave the origin HomePak; however, the pull of the GerAbr attributes is greater in the destination-type decision.

The cross elasticities of the Go-Abroad move types with one another (column 3 table D-a, with column 7, table 2-b&c) show that self employment, higher career position, social networks and residence permit have the greatest effects on the destination type. The positive branch contribution compared to the cross elasticities for both USCanAbr and GerAbr destination types reveals that the attributes (excluding salary) are the pull factors in the decision to leave the origin HomePak. From a comparison of the branch components (table 2b, col.5) of the cross elasticities on all variables, it is clear that individuals are more responsive to the USCanAbr attributes, when selecting a destination. The choice effects dominate the branch effects and capture the pull of all attributes.

From a locational comparison of the choice components of the cross elasticities between USCanAbr and GerAbr (column 6, table 2-b&c) destinations we can see that the impact of self-employment, high career position, social networks and residence permit tend to be greater for the USCanAbr destination than for the GerAbr destination. The cross elasticities suggests that the USCanAbr destination has an advantage over GerAbr when taking into account self employment, high career position, social networks and residence permit as a mean to attract individuals to the USCanAbr destination.

Now we compare the direct elasticities on HomePak (column 2, table 2-a), with the branch component of UKAbr (column 2, table 2d). We observe from the lower part of the table that lower values in magnitude of the direct elasticities are found for the destination UKAbr than those of HomePak destination. This suggests that the features of the HomePak destination have a stronger impact to retain the migrants in their home country. The larger values of the choice effects (column 3, table 2-d) compared with the branch effects show a stronger impact for choosing a UKAbr destination. While comparing the cross elasticities of the UKAbr (column 7, table 2-d) with those of HomePak destination we see higher values for the UKAbr destination suggesting a stronger impact of the attributes for the Go-Abroad destination.

8. Conclusion

We used a discrete choice random utility model to investigate individual choices among a discrete number of alternatives, taking into consideration the characteristics of each alternative, by means of a multinomial and nested logit models. This paper extends the literature on country choice by examining the factors that influencing selection of an alternative country. We may infer that personal factors were much less important than the socio-political and economic variables in accounting for the decision choice behaviors of outward migration. Also, this is a simultaneous estimate of the Stay-Home/Go-Abroad decision and the choice of country in a nested logit framework. The highly significant coefficient of the inclusive value demonstrated the value of nesting the two decisions. These results demonstrate the statistical and structural superiority of the nested model over the MCLM model. In this study we estimated the quantification effects of the determinants based on direct and cross elasticities. One of our findings reveals a high willingness, in general, to migrate to industrialised countries. From a substantive point of view, this paper has established that the country destination choice pattern of migrants in Pakistan can be explained largely by economic as well as by socio-political variables. The results of the elasticities of home destination reveals that economic aspects, such as self-employment and higher career position as well as the socio political aspects of social networks have the strongest effects for a desicion to stay-home

While comparing the direct elasticities of the HomePak with the branch components of all foreign destinations, it further reveals that self-employment, higher career position, social networks have greater attractiveness for the choice HomePak than for any other foreign destination. Contrary to this fact, salary tends to show less influence for the home destination. Racial tolerance showed less importance then the others.

A comparison of the branch components between the destinations Germany and USA/Canada, show in magnitude higher elasticity values for the USA/Canada than for Germany, suggesting a greater attraction for a foreign destination. A comparison of the cross elasticities shows that self-employment, high-career position, social networks and residence permit tend to have stronger impact for the North American destinations than for Germany. This implies that if individual migrants are more responsive to the attributes of the USCanAbr destination in determining a destination location, then the policy makers in Germany must consider these differences when implementing policies aiming at attracting highly qualified specialists. The cross elasticities for the attribute, racial acceptance, show a negative value for all foreign destinations.

Literature

Bade, K. J. (1994), Homo Migrans. Wanderungen aus und nach Deutschland. Erfahrungen und Fragen. Stuttgarter Vorträge zur Zeitgeschichte. Bd. 2, Essen.

Bartel, A. P. (1989), Where do the new U.S. immigrants live? *Journal of Labor Economics*, 7, 371–391.

Bauer, T., Epstein, G. I. and Gang, N. (2000), What are migration networks? IZA Discussion Paper No. 200, Bonn: IZA.

Bauer, T. and Zimmermann, K. (1995), Modelling international migration: Economic and econometric issues, in: R. van der Arf and L. Heering (eds), Causes of International Migration. Proceedings of a Worksho*p*, Luxembourg, 14–16 December 1994, Eurostat, pp. 95–115.

Ben-Akiva, M and Lerman, S. R. (1985), Discrete Choice Analysis: Theory and Application to Travel Demand, The MIT Press, Cambridge, Massachusetts.

Bhat, C. R. (1998), Accommodating Variations in Responsiveness to Level-of-Service Measures in Travel Mode Choice Modelling, „ Transp. Res. 32A, 495-507.

Blahusch, F. (1992), Zuwanderer und Fremde in Deutschland. Eine Einführung für soziale Berufe, Freiburg: Lambertus.

Borjas, G. J. (1987), Self-selection and the earnings of immigrants, *American Economic Review*, 77 (4), 531–553.

Borjas, G. J. (1994), The economics of immigration, *Journal of Economic Literature*, 32 (4).

Breidenbach, B. von (1982), Italiener und Spanier als Arbeitnehmer in der Bundesrepublik Deutschland. Eine vergleichende Untersuchung zur europäischen Arbeitsmigration, Munich: Kaiser, Mainz: Grünewald.

Burda, M.C., Härdle, W., Müller, M., and Werwatz, A., (1998) Semiparametric analysis of German east-west migration intentions: facts and theory, *Journal of Applied Econometrics*, 13, 525-541.

Chiswick, R. B. (1978), The effect of Americanization on the earnings of foreign-born men, *Journal of Political Economy*, 86 (5), 81–87.

Cobb-Clark, D. and Crossley, T. F. (2001), Gender, comparative advantage and labor market activity in immigrant families, IZA Discussion Paper No. 293, Bonn: IZA.

Cramer, J. S. (1991), The Logit Model: An Introduction for Economists. New York: Routledge, Chapman and Hall.

DeVoretz, D. and Maki, D. (1983), The immigration of Third World professionals to Canada: 1968–1973, *World Development*, 11, 55–64.

European Information Technology Observatory (EITO) (2000), *EITO 2000*, Frankfurt:

Faist, T. (1997), Migration und der Transfer sozialen Kapitals oder: Warum gibt es relativ wenige internationale Migranten, in: L. Pries (ed.), *Transnationale Migration*, Baden-Baden: Nomos-Verl.-Ges., pp. 63–83.

Feithen, R. (1985), Arbeitskräftewanderungen in der Europäischen Gemeinschaft. Bestimmungsgründe und regionalpolitische Implikationen, Frankfurt/New York: Campus-Verlag.

Fertig, M. and Schmid, C. M. (2001), First- and second-generation migrants in Germany – What do we know and what do people think? IZA Discussion Paper No. 286, Bonn: IZA.

Fiedler, K. (2000), Elitenmigration- migrationsbedingungen für hochqualifizierte Informationstechnologische-Arbeitskräfte in Indien am Beispiel der Green-Card Initiative, Dissertation, Lehrstuhl für Soziologie, Universität Hohenheim.

Fischer, P. A. and Staubhaar, T. (1998), Migration and Economic Integration in the Nordic Common Labour Market. Anniversary Issue: 40 Years of the Nordic Common Labour Market. Copenhagen: Nordic Council of Ministers.

Fleischer, B. M. (1963), Some economic aspects of Puerto Rican migration to the United States, *Review of Economics and Statistics*, 45, 245–253.

Forinash, C. and Koppelman; F. (1998), Application and Interpretation of Nested Logit Models of Intercity Mode Choice, Transportation Reserach Record 1413, 98-106.

Gatzweiler, H. P. (1975), Zur Selektivität interregionaler Wanderung. Ein theoretisch-empirischer Beitrag zur Analyse und Prognose altersspezifischer interregionaler Wanderung (vol. 1 of Forschungen zur Raumentwicklung series), Bonn: Bundesforschungsanstalt für Landeskunde und Raumordnung.

Greene, W. H. (2003), Econometric Analysis, fifth edition, Prentice Hall, Pearson Education International.

Greenwood, M. J. und McDowell, J. M. (1991), Differential economic opportunity, transferability of skills, and immigration to the United States and Canada, *Review of Economic and Statistics*, 73, 612-623.

Han, P. (2000), Soziologie der Migration, Stuttgart: Lucius & Lucius.

Hausman, J and McFadden, D. (1984), A Specification Test for the Multinomial Logit Model, Econometrica 52.

Hoffmann, A. (2001), Schröder spielt die Red-Green Card. Kanzler schlägt Sondervisa für ausländische Fachkräfte vor, *Süddeutsche Zeitung*, 46 (25 Feb. 2001), p. 1

Hoffman, S. D. and Duncan, G.J.(1998), Multinimial and Conditional Logit Discrete-Choice Models in Demography, Demography, 25, 415-427.

Huang, W. C. (1987), A pooled cross-section and time series study of professional indirect migration to the United States, *Southern Economic Journal*, 54, 95–109.

Institut der deutschen Wirtschaft Köln (2001), Green Card, Meist gut angekommen, Cologne: Author.

Janssen, M. (1998), Mobilität Höherqualifizierter auf internationalen und grenzüberschreitenden Arbeitsmärkten. Ergebnisse einer empirischer Untersuchung in Deutschland und den Niederlanden, in: P. de Gijsel (ed.), Mobilität und Kooperation auf grenzüberschreitenden Arbeitsmärkten: Deutschland – Niederlande, Osnabrück: Institut für Migrationsforschung und Interkulturelle Studien, pp. 77–100.

Knapp, T. A., White, N. E., and Clark, D. E., (2001), A Nested Logit Approach to Household Mobility, *Journal of Regional Science*, Vol. 41, No. 1, pp 1-22.

Körner, H. (1999), "Brain Drain" aus Entwicklungsländern, in: P. Marschalack (ed.), *IMIS-Beiträge, Nr. 11*, Osnabrück: Institut für Migrationsforschung und Interkulturelle Studien, pp. 55–64.

Liebig, T. and Sousa-Poza, A. (2004), Migration, Self-Selection and Income Inequality: An International Analysis, *KYKLOS*, Vol. 57, 125-146.

Mahmood, T. and Schoemann , K. (2003), The Migration Decision of the IT-Graduates: Emirical Evidence, PP. 277-294, in: Sustainable Development and Southern Realities, Past and Future in South Asia, Sustainable Development Policy Institute (SDPI), City Press, Islamabad.

Mayda, A. M. (2004), Who Is Against Immigration? A Cross-Country Investigation of Individual Attitudes towards Immigrants, Discussion Paper 1115, Institute for Study of Labor (IZA-Bonn).

McFadden, D. (1973), Conditional Logit Analysis of Qualitative Choice Behaviour. In Frontiers in Econometrics, ed. P. Zerembka, 105-142. New York: Academic Press.

McFadden, D. (1978), Modeling the Choice of Residential Location. In: Transportation Research Record 672. TRB, National Research Council, Washington, DC, pp. 72-77.

Maddala, G. S. (1983), Limited-Dependent and Qualititative Variables in Econometrics, Cambridge, MA: Cambridge University Press

Marr, W. L. (1975), Economic determinants of migration, Canada 1950–1967, *Nebraska Journal of Economics*, 14, 47–62.

Neugart, M. (2000), The supply of new engineers in Germany, WZB Discussion Paper FS I 00-209, Berlin: Wissenschaftszentrum Berlin.

Nielsen, H. S., Rosholm, M., Smith, N. and Husted L. (2001), Qualifications, discrimination, or assimilation? An extended framework for analysing immigrant wage gaps, IZA Discussion Paper No. 365, Bonn: IZA.

OECD (2002) (ed.) International mobility of the highly skilled, Paris:OECD

Regets, M. C. (2001), Research and policy issues in high-skilled international migration: A perspective with data from the United States, IZA Discussion Paper No. 366, Bonn: IZA.

Schipulle, H. P. (1973), Ausverkauf der Intelligenz aus Entwicklungsländern? Eine kritische Untersuchung zum Brain Drain, Munich: Weltforum-Verlag.

Stalker, P. (2000), Workers without Frontiers: The Impact of Globalization on International Migration, Boulder, CO: Rienner.

Thelen, S. (2000), Der eine braucht Muskeln, der andere Köpfchen. Ein Bildvergleich im Jahr der Greencard: Was verbindet Haranto Wijaya mit Amando Sa Rodrigues, in: Stuttgarter Zeitung, Nr. 179, 5. August 2000, S.37.

Train, K.E. (2002), Discrete Choice Models with Simulation, Cambridge University Press.

Treibel, A. (1999), Migration in modernen Gesellschaften. Soziale Folgen von Einwanderung, Gastarbeit und Flucht, 2d ed., Weinheim/Munich: Juventa-Verlag.

Unabhängige Kommission Zuwanderung (2001), Zuwanderung gestalten – Integration fördern: Bericht der Unabhängigen Kommission "Zuwanderung", 4 July 2001, Berlin: Bundesministerium des Innern.

Vogler, M. (1999), Determinanten der Zuwanderung aus Entwicklungsländern, Nomos Universitätsschriften, Wirtschaft Band 47.

Vogler, M. and Rotte. R. (2000), The effects of development on migration: Theoretical issues and new empirical evidence, *Journal of Population Economics*, 13, 485–508.

Wagener, H. W. (2000), Indiens Aderlaß in Wissenschaft und Technik, *Frankfurter Allgemeine Zeitung*, 67 (20 March 2000), p. 10.

Wimmex AG (2001), *6 Monate Greencard in Deutschland – Eine Zwischenbilanz*, in collaboration with the Bundesanstalt für Arbeit, Munich:

Winkelmann, R. (2001), Why do firms recruit internationally? Results from the IZA International Employer Survey 2000, IZA Discussion Paper No. 331: Bonn, IZA.

Zimmermann, K. F. (1994), Ökonomische Konsequenzen der Migration für den heimischen Arbeitsmarkt, *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, 129, 283–301.

Zimmermann, K. F. (1996), Ein Zuwanderungsgesetz ist längst überfällig, *Handelsblatt*, 15 May 1996, B32–B33.

Bücher des Forschungsschwerpunkts Markt und politische Ökonomie
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