No. **651**

INFORMATION,COMMUNICATION AND NETWORKS IN INTERNATIONAL MIGRATION SYSTEMS

by

Jacques Poot

November 1995

THE UNIVERSITY OF TSUKUBA
Institute of Socio-Economic Planning
Tsukuba, Ibaraki 305, Japan

INFORMATION, COMMUNICATION AND NETWORKS
IN INTERNATIONAL MIGRATION SYSTEMS

JACQUES POOT

9 November 1995

Tel. +81 298 535553; Fax +81 298 553849; E-mail poot@shako.sk.tsukuba.ac.jp

Information, communication and networks in international migration systems

Jacques Poot*

Institute of Socio-Economic Planning, University of Tsukuba,
Tsukuba, Ibaraki 305, Japan

Abstract. This paper focuses on the role of information and communication in international migration by means of a survey which covers economic and broader perspectives, both at the micro and macro levels. The human capital model of migration is reviewed and the likely impact of recent and anticipated developments in telecommunications technology is noted. The job search model is reformulated in the context of international migration but extensive modification is required to describe the potential sampling of job offers and other informational needs of international migrants. It is argued that spatial selectivity is to a large extent influenced by migration networks in which information flows play a critical role. This is further elucidated by offering an analytical framework based on the systems approach to migration.

1. Introduction

The development towards a more liberalised international network economy has intensified spatial interactions in terms of goods, services, capital, information and people. Growing migration flows are an important dimension of the intensified spatial movement of people, not only at a local or regional scale, but also at an international scale. It is evident that migration flows can have significant impacts on the sending and receiving countries and regions.

Although the world has experienced waves of human migration before, international migration has become again in recent decades a phenomenon of growing importance (Giersch 1994). In Europe especially, trans-border migration has become an important socio-economic and political issue (Penninx and Muus 1989). Following the end of the Cold War, the reinstatement of the freedom to leave in former East Block

---

countries and rising unemployment resulting from economic liberalisation, Western European countries find themselves nowadays act as reluctant hosts of many new settlers. Moreover, poverty and unemployment in developing countries (e.g. Africa) are leading to a growth in temporary and permanent migration to high income countries. Not only European countries, but also Israel, the traditional immigrant receiving countries (USA, Canada, Australia and New Zealand) and certain Asian countries (Singapore, Taiwan and Japan) have witnessed large or growing immigration flows in recent years. The migrant inflow into the largest host country, the United States, has approached one million persons per year of whom one quarter arrive illegally (Borjas 1994, p.1669). Furthermore, migration is also resulting from increasing economic integration, such as in the European Union (Werner 1993) or in Asia (Lim and Abella 1994). In addition, the growth of new foreign establishments of multinational corporations and an increased transferability of skills due to technological change and diffusion encourage a growing international movement of professionals. Finally, civil wars and political upheaval are leading to growing numbers of refugees and asylum seekers. In total, the estimated number of people outside their country of birth is about 100 million of whom one fifth are refugees and asylum seekers (Castles and Miller 1993, p.4).

These trends are the result of a complex set of historical, economic, social and political factors (Zollberg 1989). Recent surveys of the patterns, causes and consequences of international migration are given by Castles and Miller (1993), Nijkamp and Spiess (1994) and Stalker (1994). However, one factor which has received relatively little attention in the current literature is the role of information gathering in international migration. While the economics of information in the context of internal migration has been studied extensively (see for example the survey by Maier 1990), international migration presents some special issues in this respect which have not yet been extensively considered. Similarly, developments in telecommunications and information technology may have a profound impact on the international migratory movements of people, as our world may move towards a "global village".

In the light of the previous observations, the objective of this paper is to provide a brief survey of the role of information and communication in international migration.

However, both economic and broader socio-economic (institutional, political, cultural) aspects will be considered. Moreover, a distinction will be made between micro level and macro level approaches.

At the micro level, migration is considered in the mainstream economic literature the outcome of a rational decision making process by a single person or family. The individual or family is expected at suitable moments in time to weigh the costs and benefits of a move abroad when opportunities arise (or when conditions force the person or family to consider a move). There are many considerations in such decision making, but a long-term material gain resulting from an expected increase in real earnings after a move has been made is a central factor. The study of migration from this perspective is referred to as the *human capital approach*, which dates back to the seminal paper by Sjaastad (1962). Although Sjaastad's model is less suited to the study of international migration than internal migration due to a greater influence of many institutional or political factors, the model provides nonetheless a convenient starting point to elaborate on the importance of different types of information and channels of communication in the cost-benefit calculus. Such an elaboration will be offered in the next section.

The human capital model can also easily be extended to take into account search for additional information and the way in which the value of waiting for new information and the risk involved can influence the timing of a move. These issues are addressed in Section 3.

Alternatively, international migration may be seen as the outcome of socio-economic, institutional and political forces, in which individual decisions at the micro level are modified by incentives and barriers created by the societies of sending and receiving countries. This *structural* approach to migration complements the human capital approach and focuses specifically on the diverse nonpeople linkages between countries. Such linkages include the regulations regarding exit and asylum, spread of information through the media (print, TV, film), diplomatic and political relations, the diffusion of culture etc. (see for example Fawcett 1989). The structural perspective provides a better understanding of the *spatial selectivity* of migration, i.e. migrants flow

disproportionally from certain origins and are disproportionally attracted to a limited number of destinations.

At the macro level, such spatial selectivity is conventionally explained in economic terms through spatial differences in economic conditions. The central question is here whether migration has an effective equilibrating function in spatial adjustments, although the evidence is rather mixed (see e.g. Van Dijk 1989 et al. for an overview of this issue). A Keynesian perspective would emphasise quantity adjustments and point to the influence of differences in employment opportunities (e.g. spatial differences in unemployment and vacancy rates) while the neoclassical perspective would emphasise the role of price adjustment (i.e. spatial differentials in wages). However, empirical migration models often demonstrate a significant role for a migrant "stock" or previous migration flows (e.g. Greenwood 1975). The fact that migrants travel along well-trodden paths suggests that spatial selectivity may also be associated with the existence of migration *networks*. Information flows play in such networks an important role.

In addition, migration should not be considered in isolation of the short-term international movement of people (business people, tourists, students etc.) and of flows of financial capital, information, goods and services. The *systems approach* to migration considers individual decision making, migrant networks and other spatial linkages simultaneously. The role of information and telecommunication in the systems approach is addressed in Section 4, both from a static and from a dynamic perspective.

The last section concludes and establishes priorities for further research.

2. Information and the decision to migrate

During the last three decades, migration has been a fertile field for social science research. While migration may result from life cycle-related, social, political and other determining factors, economic research has demonstrated the importance of the labour market in human migration processes. Sjaastàd (1962) was the first to point out that, from the worker's point of view, migration is an investment. People consider from time to time the likely income gain and other benefits with may result from a move and compare such benefits with pecuniary and non-pecuniary costs of the move. Abstracting for the moment

from uncertainty, an individual or family will make a move when the present value of the benefits exceeds the costs and when there are no institutional or other barriers to migration (see also Molho 1986; Brosnan and Poot 1987).

It must be noted here that consideration of the *family* as the decision unit provides a more complex - but more realistic - framework (see e.g. Mont 1989) in which intra-family trade offs due to migration can be important (e.g. when migration increases the income of one family member but decreases the income of another); or in which alternative strategies are available such as the temporary worker migration of one family member who provides income to the other members through remittances (see for more detail on these issues, e.g., Borjas and Bronars 1991).

Since internal migration, in market economies at least, is not subject to extensive government regulation, internal migration data were traditionally considered a better source to test behavioural theories of migration than international migration data. Although migration research during the 1960s and 1970s was primarily concerned with finding the correlates of aggregate gross internal migration flows and mobility rates (surveyed by Greenwood 1975 and Shaw 1975; but for a more recent contribution to modelling gross flows, see e.g. Jackman and Savouri 1992), many further insights were obtained by micro-level studies of survey data (reviewed by, for example, Greenwood 1985).

However, the increasing volume of the international movement of people in all parts of the world in recent years has led to growing research and debate on international migration. Such migration encompasses many different types of movement. Migrants include: settlers with an intention of staying in the host country permanently, people who move from a host country to a third country (*repeat* migrants) or who return to their country of birth (*return* migrants), unskilled and semi-skilled contract workers, expatriate professionals, illegal immigrants, asylum seekers and refugees, retired persons and students. In general, an international migrant is a person who resides for most of a certain minimum period of time, defined by a statistical agency or researcher, in one country and most of the following period in another country (one year is the commonly adopted period to distinguish between migrants and short-term visitors). However, the

proportion of migrants for whom the move is a once in a lifetime event is declining. Professionals with internationally transferable skills may reside in a number of countries throughout their working lives, students and refugees may become return or repeat migrants, etc. Hence migration decisions may be made several times throughout a lifetime.

Despite this diversity, all migrants (except in the case of forced movement) have in common that they must take a spatial choice decision based on *anticipated* cost and benefits accruing *over time*. Hence, migration is a clear case of *forward looking* behaviour. It is not surprising therefore that it has been sometimes modelled as an intertemporal optimisation problem of locational choice (see e.g. Polacheck and Horvath 1977 in the case of internal migration).

However, conventional migration theories rarely explicitly consider the information gathering required for taking such single or sequential migration decisions. The way in which potential migrants form expectations through information obtained by means of various *information channels* can obviously play an important role in the observed outcomes. The distinction between *formal* information channels (such as recruitment agencies and newspaper advertisements) and *informal* information channels (e.g. contacts, professional or trade conferences, personal inquiries) is well known, but a related distinction can be made between *source* information and *interactive* information (Ralston 1983). Source information is employer-initiated, one-way oriented and aimed at reaching a large number of potential job applicants quickly. Interactive information is spread by "word of mouth", two-way oriented and can only reach a limited number of people. The spread of the information is dependent on social networks of potential job applicants and the information is therefore less controllable by the employer. Hence, informal search channels basically convey interactive information while formal recruitment channels mainly convey source information (Russo et al. forthcoming).

In the case of international migration, not only labour market information is relevant. Information about consumer prices, local amenities, political and social conditions and even the environment or climate can also play a role. The latter types of information would also be particularly important for retirement migration, which is a

growing phenomenon in internal population redistribution in the ageing developed countries, but which is expected to become increasingly important internationally as well (e.g. in the European Union).

To highlight the role of information, it is useful to take one representative theory of migration as a benchmark. Migration is a phenomenon which has attracted the interest of scholars in the full spectrum of social science disciplines. It is therefore not surprising that there is a variety of theoretical approaches. These include the "push-pull' theory (Jackson, 1969), the neoclassical human capital (or cost-benefit) model (Sjaastad, 1962; Borjas, 1989), the value-expectancy model (De Jong and Fawcett, 1981) and historical-structural theories (Sassen, 1988). Despite its limitations (see also Castles and Miller, 1993, pp.19-26), the neoclassical model provides a useful starting point to highlight the role of information flows and channels in migration.

The human capital model suggests that individuals and families throughout their working lives compare the present value of the stream of earnings at the present location with those at alternative locations and the costs of a move. Standard investment theory can be invoked to suggest that migration will take place when the Net Present Value (NPV) of this decision is positive. In its simplest form, the NPV of migration from i to j is given by

$$NPV = \sum_{t=0}^{T} \left[y_t^j / p_t^j - y_t^i - c_t^{ij} \right] (1+r)^{-t} \tag{1}$$

where T is the relevant planning horizon (e.g. expected age of retirement), y_t^j / p_t^j is the expected income in the destination country at time t in purchasing power parity terms, y_t^i is the expected income at time t in origin country i, c_t^{ij} is the monetary value of the direct and psychic cost associated with the move (which need not be restricted to the initial period) evaluated at country i prices and r is the person's or family's internal rate of time preference.

In practice, there are two different types of migrants and the NPV calculations will differ between these. *Contract migrants* search for job offers in potential destinations and only migrate when at least one offer yields a positive net benefit. In contrast,

speculative migrants base the decision to migrate on the expected earnings of similar individuals in potential destinations and search for job offers after the move has been made (see also e.g. Molho, 1986). Jackman and Savouri (1992, p.1434) note that, due to modern telecommunications and information technology, speculative migration is unlikely at the regional level. However, the incidence of speculative migration is likely to be a matter of distance: at large distances speculative migration becomes more likely as information may be harder, i.e. costlier, to obtain. This is particularly true for unskilled and semi-skilled workers. The main cause of this is the employers' practice of advertising positions for such workers only at the local or regional level. At the national level, some speculative migration is plausible over large distances, particularly among lesser skilled workers (e.g. migration between the East Coast and the West Coast in North America and similarly in Australia). As expected, research shows that speculative migration is quite common in a large country such as the United States but non-existent in a small country such as The Netherlands (Van Dijk et al. 1989). At the international level, speculative migration is the dominant type as job search can usually only commence after a residency permit has been obtained (or a border has been crossed illegally). However, vacancies for highly skilled workers such as medical professionals, engineers, academics and computer specialists are often advertised internationally or filled with the aid of "head-hunting" recruitment agencies so that many migrants with these occupations are contract migrants (Stalker 1994, pp.36-39).

However, in both cases potential migrants must take into account the *uncertainty* associated with wages, prices and other conditions in future years. This aspect is usually incorporated in theoretical analyses by means of expected utility theory as axiomatised by von Neumann and Morgenstern (1944), although there are alternative approaches (see for a survey, e.g. Jeffcoat 1989). In practice, if we assume that potential migrants are risk averse and are guided by subjective probability distributions of outcomes, they can adopt alternative decision criteria such as the *Coefficient of Variation* criterion or the *Certainty Equivalence* criterion.

Although the choice between speculative and contract migration is likely to be conditioned by the worker's characteristics such as age, experience and qualifications, the

migrants' attitude to risk may play a role too. The speculative migrant is likely to be less risk averse than the contract migrant. At the level of internal migration, Mueller (1981) notes that speculative migrants - usually unemployed during job search - take significant risks. Differences in preferences with respect to risk between international migrants and stayers and between classes of migrants is a research area to be explored further.

Borjas (1989) reformulated (1) by taking explicitly the distribution of earnings in relation to human capital characteristics such as age and skills into account. This approach makes it possible to explain why migrants are generally not a cross-section of the population. For example, if a host country rewards certain qualifications better than the source country, people with such qualifications will be overrepresented in the immigrant flow, i.e. they are self-selected. Similarly, if unobserved ability leads to people being at the upper end of the income distribution (for given skills and experience), persons with such ability will be overrepresented in migration flows to countries where earnings are more dispersed.

The availability of information and the communication channels through which further information can be obtained affect the calculation of the return to migration as in (1) in two different ways: first, through uncertainty about the earnings distributions and prices (y_t^j / p_t^j, y_t^i) and, second, through the cost of migration c_t^{ij}. The former problem can be tackled by gathering information through sampling job offers etc. This issue will be addressed in the next section. The latter problem, the cost of migration, is traditionally assumed to be correlated with *distance* for reasons detailed below. It should be noted, however, that in international migration the distance deterrence factor may be overshadowed by institutional factors shaping the migration patterns. Poot (forthcoming) has shown nonetheless that where international movement is not subject to control (such as in Australasia), distance has a significantly negative effect on gross international migration flows.

There are several reasons why the cost of migration increases and, hence, the likelihood of migration decreases with distance, *ceteris paribus*:

(i)   For speculative migrants, the uncertainty about the earnings distribution and about the cost of living in potential destinations increases with distance. The increase in

uncertainty about prices and other factors which influence utility are also a deterrent to long distance migration among contract migrants.

(ii) The pecuniary costs of migration (fares, removal of household goods) increase with distance.

(iii) The transportation cost of visiting relatives and friends back home increases. Moreover, the costs of communicating with these relatives and friends (e.g. by telephone or fax) also increases.

(iv) The amount of knowledge which the migrant has about the living and working environment in the destination country declines with distance. The linkages with neighbouring countries in terms of trade, tourism, media coverage etc. may be stronger than with far-away countries. Hence, the *psychic cost* of migration increases with distance.

Presently we observe that the distance deterrence effect appears to be declining, due to the rapid technological and structural global change in transportation and telecommunications. This is one factor responsible for the growth in the volume of international migration in recent decades.

At the micro level we expect that the distance deterrence effect is weaker at higher levels of education, as the higher educated may be multilingual and are generally more efficient processors of information regarding opportunities abroad. Consequently, the trend towards increased participation in post-compulsory education also contributes to growing geographic mobility over long distances.

Moreover, except for the temporary effect of the 1970s oil price hikes, the real cost of air travel has exhibited a long-term downward trend. For example, the real cost of air travel in developed countries such as Australia and New Zealand has declined by a factor of three since the 1950s (Poot 1993, p. 294).

Similarly, the real cost of long distance telephone calls has declined, while the ease of use has increased. International telephone calls increased fivefold between 1980 and 1990.

An increasing number of calls connect migrants to their home countries. This new development is clearly demonstrated by the advertising of special rates for such calls by

the international telephone companies. Generally, the geographic distribution of the growth in international telephone calls is correlated with the migration streams, as was evidenced by Stalker (1993) for the case of Japan.

Another factor responsible for a smaller distance deterrence effect is that satellite and cable television provide the potential migrant with extensive information about the standard of living and life styles in a wide range of countries. Information about developed countries penetrates poor countries through the global domination of Western media. Satellite TV networks have generated global news stations and global advertising. Cable News Network (CNN) enables the English-speaking migrant to obtain some daily news from the home country even when he or she has no command of the language of the host country. Star TV, a satellite TV station based in Hong Kong, reaches 38 Asian countries.

A development which in future may further enhance the volume and scope of information available to migrants is the emergence of electronic information networks such as Internet. New technologies in multi-media computing and the accompanying decline in cost and increasing use of home computers may enable migrants eventually to keep in touch with their home countries in unprecedented ways.

In summary, these information and communications technology developments reduce the "emotional distance" between migrants and affect the costs, benefits and uncertainty in the cost-benefit calculus of migration to the extent that the rate of return to migration will increase. This, in turn, may lead to a *potential* for higher international geographical mobility.

3. The search for information in international migration

The evaluation of the costs and benefits of migration requires sufficient knowledge of the socio-economic, cultural and political conditions in a broad spectrum of possible destinations. While many economic models of household behaviour assume decision making with perfect foresight, this is clearly an unrealistic assumption in migration behaviour. A spatial differentiation in the access to, or availability of, information may contribute to the shaping of specific transborder migration patterns.

When there is imperfect information, additional information can be acquired at a cost. An extensive economic literature has developed regarding the search for information, particularly regarding jobs. A recent overview can be found for example in Devine and Kiefer (1991). The economics of information has been incorporated in the theory of migration decision making. This literature has focussed primarily on the spatial aspects of job search processes (e.g. David 1974, Rogerson 1982, Maier 1985, Gorter 1991, Russo et al. forthcoming). Surveys of the literature conclude that the spatial layout and operation of information channels may have a considerable impact on migration patterns (e.g. Maier 1990).

Little attention has been paid to information gathering in international migration. However, the basic idea that information gathering is costly and that search for additional information continues until the marginal cost of additional search equals the expected benefit (assuming risk neutrality) would apply here also (apart of course from forced migration). This idea goes back to the seminal work of Stigler (1961,1962) and is further elaborated by Lippman and McCall (1976,1979).

Before considering the plausibility of the job search model in international migration, it is useful to briefly summarise the standard model. As in the previous section, migrants are assumed concerned with maximising discounted future income in the presence of imperfect information. The standard model has a number of strong assumptions (the implications of these are discussed by Lippman and McCall 1976). They are: firstly, job searchers are risk neutral; secondly, the time horizon is infinite and there is no discounting; thirdly, the marginal search cost is constant; fourthly, job searchers have identical human capital and jobs are qualitatively the same; fifthly, there are no quits and layoffs and all searchers are unemployed; and finally, searchers have full knowledge of the distribution of wage offers available and one offer is generated every period. Under these assumptions, the job searcher computes a reservation wage w* and the first job offer which is received above this wage offer is accepted. The reservation wage w* satisfies the equation

$$s = \int_{w*}^{\infty} (w - w*) f(w) dw \tag{2}$$

where s is the cost of search per job offer and f(w) is the known wage offer distribution function. This model has the properties that (i) an increase in the search cost reduces the reservation wage; and (ii) an increase in the variance of f(w) for a given mean increases the reservation wage.

The extension of this model to search in international migration is in principle straightforward. Let us first consider the case of the contract migrant, which is the case closest to that of interregional spatial search analysed by Rogerson (1982). Assume that the distribution of wages (for given human capital characteristics) in country j is $f_j(w)$ and that these distributions across countries are independent. The cost of obtaining a job offer in country j for a resident of country i is given by s_{ij}. This cost is less likely to be straightforwardly related to distance than in the case of search within a country, but we would expect nonetheless that - due to the rising cost of transportation and information exchange - s_{ij} will be positively related to the distance between i and j. In this case, the searcher in i has a reservation wage w_{ij} for each country j which is given by

$$w_{ij} = -s_{ij} + w_{ij}F_j(w_{ij}) + \int_{w_{ij}}^{\infty} x dF_j(x)$$ (3)

where $F_j(.)$ is the cumulative distribution function. The optimal strategy is easily determined. Rogerson (1982) discusses two different cases. In the first case, search is limited to one job offer per country (e.g. a residence permit may be tied to accepting certain jobs during the first few years after immigration, as was the case with assisted migration to Australia and New Zealand in the early post-war period). In this case, the optimal strategy consists of two parts, a *selection* rule (always choose the country with the highest reservation wage) and a *stopping* rule (stop searching after the first job offer which exceeds the reservation wage). In the second case, repeated search is possible in a country. In this case, search will only take place in the country with the highest reservation wage. However, in both cases search will stop when a job offer is obtained which exceeds the (country-specific) reservation wage. Finally, the actual decision

whether to migrate is then based on the weighing of migration costs and benefits along the lines discussed in the previous section.

The model for speculative international migration is similar to Maier's (1987) basic model of spatial search within a country. Here we assume that the speculative migrant knows the wage offer distribution $f_j(w)$ as before, but now also knows the *local* search cost s_j. The annuitised cost of migration is c_{ij}. In this case, the optimal decision rule is simply to migrate to the country with the highest reservation wage minus the annuitised cost of migration, $w_j - c_{ij}$. In this way, the speculative migrant can calculate exactly the expected returns of migration to any country, although the actual income in the chosen country will be a random variable.

In summary, a potential migrant would calculate a reservation wage for each country (in which search costs and wage offer distributions would vary between countries) to which he or she has access and then only sample job offers (before or after migration) from the country which generated the highest reservation wage net of migration costs. The implication is that a choice of country is made first, before the sampling of job offers commences. Such an approach of course assumes that the economic conditions in the host country are relatively stable so that a job seeking migrant may have some confidence that the wage offer distribution on which the decisions are based is indeed the actual one.

Various extensions of the basic search model are possible and the implications for migration can be considered (see Maier 1990). For example, when there is only a limited number of wage offers available or when the worker is risk averse, the reservation wage declines over time. This may lead to a revision of a migration decision. Because more job offers may be expected in more highly populated heartland regions or countries, the search model also provides an explanation for the *gravity property* of migration flows.

The main weaknesses of the conventional search models are, first, the assumption of full knowledge of the wage offer distribution and, second, the absence of explicit consideration of the way in the behaviour of employers affects the creation and advertising of job vacancies. Both these weaknesses can be overcome, but of course at the cost of increasing mathematical complexity.

Saunders (1990) investigated the role of vacancy notification in local government recruitment in the United Kingdom and found that the way in which an employer notifies a vacancy will affect those who hear about and, hence, the previous location of the person who will be appointed. Newly hired professional workers are likely to have migrated because the number of potential applicants increases with the radius of vacancy posting and because the radius of advertising for professional jobs is much larger than for clerical and manual vacancies. A similar phenomenon operates at the level of international migration. Active recruitment from abroad will only be undertaken when employers perceive a national shortage in labour supply of the particular type. Consequently, contract migrants are overrepresented in those occupations which are advertised through international information channels.

It is in this respect noteworthy that the conventional theory of reservation wages can be extended by introducing the concept of *reservation productivity*: a critical threshold level set by the employer for new workers in terms of their expected and required productivity (influenced by their education, training and skill; see Russo et al. 1994). This means essentially a comparison of the reservation wage and reservation productivity in order to arrive at an equilibrium solution. This has also a clear relevance for international migration, as the productivity of new migrants workers is not known with certainty.

Indeed, the fact that employers in host countries have less information about the abilities of migrants than the migrants themselves, or the employers in their home countries, led Stark (1991) to study the impact of such *asymmetric* information on migration patterns. Stark argues that employers will pay migrants a wage based on the perceived average productivity of all migrants in a certain occupational class rather than the actual skill level of the workers (often referred to as *statistical discrimination*). The informational asymmetry generally reduces the volume of international migration and the average skill level of migrants. The use of probationary periods of employment as a screening device or acceptance of foreign trade certificates or other professional qualifications by the host country's employers as signalling devices, raises both the quality and the quantity of migrants.

Similarly, workers will in general only have limited information about wage offer distributions in potential destinations. Such information can come from a range of sources, formal and informal. In international migration, formal information channels include newspaper advertisements, employment agencies and meetings organised by migration agencies and prospective employers. Because immigration regulations are complex, private intermediaries have emerged in the countries with official immigration quotas to assist prospective immigrants with applications.

Informal information is provided through the media and through personal contacts. When the formal information sources for prospective migrants are limited, *migrant networks* become a strong force to shape migration patterns. Such networks may commence with pioneer migration of one individual, followed by migration of relatives and other members of the migrant's home region. The establishment of migrant networks is a self-reinforcing (*positive feedback loop*) process. Once migrant communities are established, better quality information is passed back to the home country and the psychic cost of migration is also reduced. The exchange of information in migrant networks is also facilitated by the emergence of ethnic media, such as foreign language newspapers.

The immigrant community is a vital source of information. For example, a study of Filipino immigrants in the United States showed that the primary source of information was not one of the formal information channels (US embassy etc.) but personal contacts with Filipinos already residing in the United States (Dumon, 1989). Stalker (1994, p. 35) notes that the intensifying of global communications combined with the growing migration flows is creating a new kind of "global family" where the household is not so much a residential unit as a network of exchanges.

Over time, migrants build up knowledge about local labour markets, prices, amenities, social security regulations, etc. Such knowledge is location-fixed capital in that it has no value at other locations (e.g. DaVanzo, 1980). The fact that such knowledge capital builds up over time, is one reason for the well known *cumulative inertia* (or negative duration dependence) effect in migration: the probability of a second move declines the longer a person has resided in one region or country.

Immigrants tend to be highly urbanised due to various urban pull factors such as higher employment growth and the presence of immigrant communities (Cross 1989). Since an urban community of foreign immigrants is normally showing a high degree of social cohesion, such communities also act as a source of information for new migrants. Consequently, new foreign settlers are strongly induced to move to urban areas in their new host country in order to benefit from their existing social-support system.

In summary, the standard job search model requires extensive modification in order to describe the potential sampling of job offers and other informational needs of international migrants. The nature of the search process would also depend on the type of migrant. The distinction between contract and speculative migrants provides a clear dichotomy. Professional and skilled workers are more likely to search for foreign jobs while they are still employed (i.e. they engage in on-the-job search). Migration will usually only be undertaken when a satisfactory job offer has been obtained. Hence, they are more likely to be contract migrants rather than speculative migrants. Information on foreign vacancies can be obtained *inter alia* from formal information channels such as newspapers, professional magazines or human resource management firms. "Head-hunting" firms also often act as intermediaries in the provision of information on prices of consumer goods and services, the availability of public facilities, etc. Alternatively, business travel and participation in conventions act as informal information channels to provide the professional worker also with information about foreign job markets.

Institutional arrangements are such that these information sources are not readily available to lower skilled workers. Given structural changes in sending countries with a decline in employment opportunities for such workers, the decision to migrate is also more likely to have been motivated in this case by unemployment or a risk of being laid off than in the case of higher skilled workers. Instead, these workers are more likely to be speculative migrants for whom the migrant network is an important source of information both in providing the information which motivates the decision to move and for the actual local job search once the move has been made. The migrant network can also be very important when there are cultural or language barriers which thwart individual job search.

Beside the introduction of a reservation wage which may decrease over time when no satisfactory job offers are received, the human capital and search models introduced here do not have other explicitly dynamic features. However, new insights have been obtained in the general theory of business investment in recent years which emphasise the importance of the correct timing of the investment (e.g. Dixit and Pindyck 1994). The new theory argues that firms have an *option* to proceed with a project. They can exercise this option immediately or wait before deciding to proceed, or not, until new information has been obtained. The term option has been chosen deliberately, because there is a similarity between this situation and that of a so-called "call option" in financial markets.

While models in which information about the wage offer distribution, search costs and other costs can be incorporated in the search models by means of permitting an updating of prior beliefs (see e.g. Maier 1987, 1990), the key point is here that the potential migrants does not always have control over when such information becomes available (e.g. information about political decisions affecting immigration regulations and labour market conditions). Yet in migration, as in many investment decisions, the costs of migration and search become sunk costs after the move has been made. This is particularly true for speculative migrants.

The uncertainty about job offers in the destination is likely to increase in recessions. This suggests that in recessions there is less incentive to "kill the option" of migration and moves may be postponed. Consequently, internal migration rates tend to be pro-cyclical (see Pissarides and Wadsworth 1990 and Jackman and Savouri 1992 for evidence in Britain), but the propensity to migrate internationally may similarly be affected by the business cycle. Given the distinction we have made between contract migrants and speculative migrants and the *irreversibility* of a relative large migration cost for the latter, speculative migration is expected to be more cyclical than contract migration.

4. A migration systems approach

In the previous two sections we considered the roles of information gathering, telecommunications developments and information networks in migratory movements

from the perspective of the decision making of individuals. It was already noted in the introductory section that for a fruitful analysis of international migration at the micro level the human capital and search approaches needs to be combined with the insights of the structural (i.e. institutional, political and cultural) approach and, furthermore, that the spatial linkages leading to migration flows are best studied from a systemic perspective. Similarly, at the macro level the study of spatial price or quantity adjustments in labour markets and the migrant networks which facilitate such adjustments also benefits from such a systemic perspective (see also Nijkamp and Voskuilen 1994).

A formal systems approach of internal migration flows was first attempted by Mabogunje (1970), but see also Kanaraglou et al. (1986). Fawcett and Arnold (1987) adopted this approach for the study of international population movement in the Asia-Pacific region. They noted several advantages of the systems approach. Firstly, attention is directed to both the origin and destination of a migration flow and a comparison of conditions in both is made naturally. Secondly, flows are considered as being linked to other flows so that the *interconnectedness* of the system is brought to the fore. A well known theoretical model of movement with this property is described by Alonso (1978). Thirdly, the diverse linkages between places through flows of information, goods, services, money, people and ideas are highlighted. Finally, the systems approach reinforces the view of migration as an on-going process.

However, the design of a comprehensive dynamic-systemic model of migration is far from easy. The complexity of the phenomenon may thwart the design of an operational and empirically verifiable model. For example, Stalker (1994, p.22) notes that the systems approach works best when it focuses on roughly self-contained systems of small groups of countries, such as the flows between North and Central America or between North Africa and Europe, and that a systems description of global migration may be too complex to be useful. Nonetheless, in recent times a trend has emerged towards the development of global models to investigate issues such as trade liberalisation and international environmental policy co-ordination and this suggests that international migration may eventually be embedded in such global modelling and that a dynamic-systemic model may result.

Figure 1 provides therefore a very simple conceptualisation of the linkages and networks in a migration system, which can highlight the role of telecommunications developments and information networks. Each of the layers in Figure 1 represents a network of a particular type of international flow. Hence, in addition to labour migration, there are layers for flows of goods, services, financial transactions, information and the circulatory movement of people such as business travel and tourism. Yet, each type of flow is in itself still heterogeneous and a further disaggregation is desirable. For example, we noted in the introduction that permanent and long-term migration is a heterogenous mix of new settlers, contract migrants, retirement migration etc.

Figure 1 about here

In the simplest form, the nodes may represent nation-states but the sub-national breakdown of incoming and outgoing flows (such as the regional settlement patterns of migrants, or the origins of international phone calls) may also be of interest. At each layer, the flows are of course facilitated by telecommunication and transportation infrastructures. However, in addition to the physical infrastructure, there are also monetary, psychological, legal, political and social *incentives* and *barriers*. For example, certain nodes may not be linked through migration when such migration is not legally permitted (usually by the potential host country).

At each node, the flows will have a two-way interrelationship with the local *conditions*, which may be broken down at different levels of disaggregation, such as the national level, the sectoral level (business and social communities) and the family/personal level. At each level, conditions may be categorised into vectors of economic, social and physical (e.g. health, environment) attributes. Consequently, the nodes are depicted in Figure 1 by matrices. The *potential* for movement will be a function of the similarity or dissimilarity of conditions at both ends. For example, migration pressures are related to the gap in expected real earnings, but inter-country differences in the demographic transition also lead to huge differences in labour supply growth which, in turn, may fuel migration.

The flows in the various layers of the multi-layer network are linked. Several examples may be of particular interest in the context of the study of migration flows:

(i) trade may lead directly to migration. For example, the establishment of overseas offshoots of local firms, producing for export markets, may lead to contract migration of professionals to assist in the setting up of the new plants. At the macro level, migration and trade may be substitutes or complements (see Ethier forthcoming).

(ii) the growing accessibility of detailed information about foreign countries through better and cheaper telecommunications systems encourages migration.

(iii) migration flows lead to significant financial flows in the form of remittances. The global flow of remittances may now be approaching 100 billion US dollars (see also Stalker 1994, pp. 122-129).

(iv) circulatory movement, such as tourism may lead to migration (e.g. working holidays). Conversely, past migration also encourages tourism flows.

There are many features of international spatial interactions which necessitate a dynamic formulation of the framework described above. Such a dynamic and systemic approach raises issues of equilibrium and stability (see e.g. Nijkamp and Poot, 1987).

There are many *positive feedback loop* effects in such a dynamic-systemic framework, which will lead to properties of sensitivity to initial conditions and path dependency. For example, a single individual from a village may migrate to a city in a foreign country where conditions are very favourable. When this information is conveyed back to the village, other villagers may follow and a process of *chain migration* is generated. Through family migration and natural increase, a migrant community will emerge in the host city. The presence of such a community even further strengthens migration. Migrant *enclaves* may slow down integration, but they also have the social function of, through peer pressure, encouraging the remittance of funds back home.

The inherent nonlinearity of the dynamics in a migration system explains why migrant communities are geographically concentrated in particular regions (e.g. in California and Florida in the USA) and why emigration propensities are so much higher

in some countries than in others (compare e.g. historical emigration from France and Germany).

Migration legislation may also encourage chain migration, since many countries permit family reunification, which leads to an immigration multiplier effect (see Jasso and Rosenzweig, 1986).

The examples above highlight the complexity of a dynamic migration system. Nonetheless, it is evident that the telecommunication infrastructure and the resulting information flows affect migration flows directly through the processes described in earlier sections, but also indirectly through the impact on the other types of international flows, which themselves have an interrelationship with migration flows.

5. Conclusion

Our network-oriented society has at a global scale not only induced large flows of traded commodities and intensive flows of transmitted information, but also large scale movements of people. International migration is one such phenomenon, be it voluntarily or in a forced manner. But irrespective of the motives of migration, it has become clear that each potential migrant, once migration has entered the set of feasible options, becomes a new opportunity seeker whose search process is guided by formal and informal information acquired through the advanced communication sector or through informal contact networks. Consequently, the size, composition and direction of international migration flows is to a significant extent contingent on the information transfer regarding the benefits and disadvantages of potential host countries (including information on regulatory regimes regarding contract migration, permanent settlement and asylum).

Research in this field should address in particular a series of strategic-behavioural issues of which, in conclusion, the most prominent ones will be mentioned here. First there is a need for more insight into the functioning of information and communication mechanisms regarding the characteristics of a host country which are regarded as attractive features by potential migrants (e.g., the influence of radio or television vis-a-vis the role of informal personal networks on migration behaviour). Secondly, it would be

interesting to investigate further the range of items of information on which migrants base their decision (such as labour market conditions, social support mechanisms, social security systems, prices of consumer goods, public amenities, etc.). Thirdly, the way in which potential migrants form expectations and their attitude to risk are also of interest. And finally, as suggested by the discussion of systems perspective in the previous section, more theoretical and empirical work is required on the interaction between migration flows and other international linkages.

References

Alonso W (1978) A theory of movements. In: Hansen NM (ed) Human settlement systems. Ballinger, Mass

Borjas GJ (1989) Economic theory and international migration. International Migration Review 23(3):457-485

Borjas GJ (1994) The economics of immigration. Journal of Economic Literature 32(4): 1167-1717

Borjas GJ, Bronars SG (1991) Immigration and the family. Journal of Labor Economics 9(2):123-148

Brosnan P, Poot J (1987) Economic and demographic aspects of Trans-Tasman population exchange. New Zealand Population Review 13(2): 4-16

Castles S, Miller MJ (1993) The age of migration. Macmillan, London

Cross M (1989) Migrants and new minorities in Europe. In: Entzinger H, Carter J (eds) International Review of Comparative Public Policy. JAI Press, Greenwich Conn

DaVanzo J (1980) Repeat migration, information costs, and location-specific capital. Rand Paper P-5787, The Rand Corporation, Santa Monica

David PA (1974) Fortune, risk and the microeconomics of migration. In: David PA, Reder MW (eds) Nations and Households in Economic Growth. Academic Press, New York

De Jong GF, Fawcett JT (1981) Motivations for migration: an assessment and a value expectancy research model. In: De Jong GF, Gardner RW (eds) Migration

decision making: multidisciplinary approaches to microlevel studies in developed and developing countries. Pergamon Press, New York

Devine TJ, Kiefer NM (1991) Empirical labor economics: the search approach. Oxford University Press, Oxford

Dixit A and Pindyck R (1994) Investment Under Uncertainty. Princeton University Press, Princeton

Dumon W (1989) Family and migration. International Migration 28(2):

Ethier W (forthcoming) Theories about trade liberalisation and migration: substitutes or complements? In: Lloyd PJ, Williams LS (eds) International Trade and Migration in the APEC Region. Oxford University Press

Fawcett JT (1989) Networks, linkages, and migration systems. International Migration Review 23(3):671-680

Fawcett JT, Arnold F (1987) Explaining diversity: Asian and Pacific immigration systems. In Fawcett JT, Carino BV (eds) Pacific bridges: the new immigration from Asia and the Pacific Islands. Center for Migration Studies, Staten Island

Giersch H (ed) (1994) Economic aspects of international migration. Springer-Verlag, Berlin

Gorter C (1991) The dynamics of unemployment and vacancies on regional labour markets. PhD thesis, Free University, Amsterdam

Greenwood MJ (1975) Research on internal migration in the United States: a survey. Journal of Economic Literature 13:397-433

Greenwood MJ (1985) Human migration: theory, models and empirical results. Journal of Regional Science 25(4):521-567

Jackman R, Savouri S (1992) Regional migration in Britain: an analysis of gross flows using NHS central register data. The Economic Journal 102(November):1433-1450

Jackson JA (ed) (1969) Migration. Cambridge University Press, Cambridge

Jasso G, Rosenzweig MR (1986) Family reunification and the immigration multiplier: U.S. immigration law, origin country conditions, and the reproduction of immigrants. Demography 23(3):291-311

Jeffcoat C (1989) Choice under uncertainty. Journal of Economic Surveys 3(1):97-108
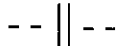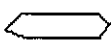
Kanaroglou P, Lidaw KL, Papageorgiou YY (1986) An analysis of migratory systems: I. theory. Environment and Planning 18:913-928

Lim LL, Abella M (1994) The movement of people in Asia: internal, intra-regional and international migration. Asian and Pacific Migration Journal 3(2-3):209-250

Lippman SA, McCall JJ (1976) The economics of job search; survey (Parts I and II). Economic Inquiry 14:155-189 and 347-368

Lippman SA, McCall JJ (1979) Studies in the economics of search. North-Holland, Amsterdam

Mabogunje AL (1970) Systems approach to a theory of rural-to-urban migration. Geographical Analysis 2:1-17

Maier G (1985) Cumulative causation and selectivity in labour market oriented migration caused by imperfect information. Regional Studies 19(3):231-241

Maier G (1987) Job search and migration. In: Fischer MM, Nijkamp P (eds) Regional labour markets, North-Holland, Amsterdam

Maier G (1990) The economics of information in the context of migration. In: Johnson JH, Salt J (eds) Labour migration: the internal geographical mobility of labour in the developed world. David Fulton Publishers, London

Molho I (1986) Theories of migration: a review. Scottish Journal of Political Economy 33(4):396-419

Mont D (1989) Two earner family migration. a search theoretic approach. Journal of Population Economics 2(1):55-72

Mueller CF (1981) Migration of the unemployed: a relocation assistance program. Monthly Labor Review 104(4):62-64.

Nijkamp P, Poot J (1987) Dynamics of generalised spatial interaction models. Regional Science and Urban Economics 17(3):367-390

Nijkamp P, Spiess K (1994) International migration in western Europe: macro theories in the past, the present and the future. Current Politics and Economics of Europe 3(3-4):238-262

Nijkamp P, Voskuilen M (1994) International migration: a comprehensive framework for a survey of the literature. Research Memorandum, Department of Regional Economics, Free University, Amsterdam

Penninx R, Muus P (1989) No limits for migration after 1992? International Migration 27:373-387

Pissarides CA and Wadsworth J (1990) Unemployment and the inter-regional mobility of labour. The Economic Journal 99(September):739-755

Polachek S and Horvath F (1977) A life cycle approach to migration: analysis of the perspicacious peregrinator. Research in Labour Economics 1:103-149

Poot J (1993) Trans-Tasman migration and economic growth in Australasia. In: Carmichael GA (ed) Trans-Tasman migration: trends, causes and consequences. AGPS, Canberra

Poot J (forthcoming) Do borders matter? A model of interregional migration in Australasia. Australasian Journal of Regional Studies

Rogerson P (1982) Spatial models of search. Geographical Analysis 14(3):217-228

Ralston B (1983) The dynamics of communication. In: Griffith DA, Lea AC (eds) Evolving geographical structures. Martinus Nijhoff, The Hague

Russo G, Rietveld P, Nijkamp P, Gorter C (1994) Employers' search strategies. Discussion paper TI 94-78, Tinbergen Institute, Amsterdam

Russo G, Rietveld P, Nijkamp P, Gorter C (forthcoming) Spatial aspects of recruitment behaviour of firms. Environment and Planning A

Sassen S (1988) The mobility of labour and capital. Cambridge University Press, Cambridge

Shaw RP (1975) Migration theory and fact: a review and bibliography of current literature. Regional Research Institute, Philadelphia

Sjaastad L (1962) The costs and returns of human migration. Journal of Political Economy 70(Supplement):80-93

Stalker P (1994) The work of strangers: a survey of international labour migration. International Labour Office, Geneva

Stark O (1991) The migration of labor. Blackwell, Cambridge Mass

Stigler GJ (1961) The economics of information. Journal of Political Economy 69(3):213-225

Stigler GJ (1962) Information in the labor market. Journal of Political Economy 70(1):94-105

Saunders NK (1990) Migration and job vacancy information. In: Johnson JH, Salt J (eds) Labour migration: the internal geographical mobility of labour in the developed world. David Fulton Publishers, London

Van Dijk J, Folmer H, Herzog HW, Schlottmann AM (1989) Labor market institutions and the efficiency of interregional migration: a cross-nation comparison. In: Van Dijk J et al. (eds) Migration and labor market adjustment. Kluwer, Dordrecht

Von Neumann J, Morgenstern O (1944) Theory of games and economic behaviour. Princeton University Press, Princeton

Werner H (1993) Migration movements in the perspective of the single European market. In: The changing course of international migration. OECD, Paris

Zollberg AR (1989) The next waves: migration theory for a changing world. International Migration Review, 23:403-429
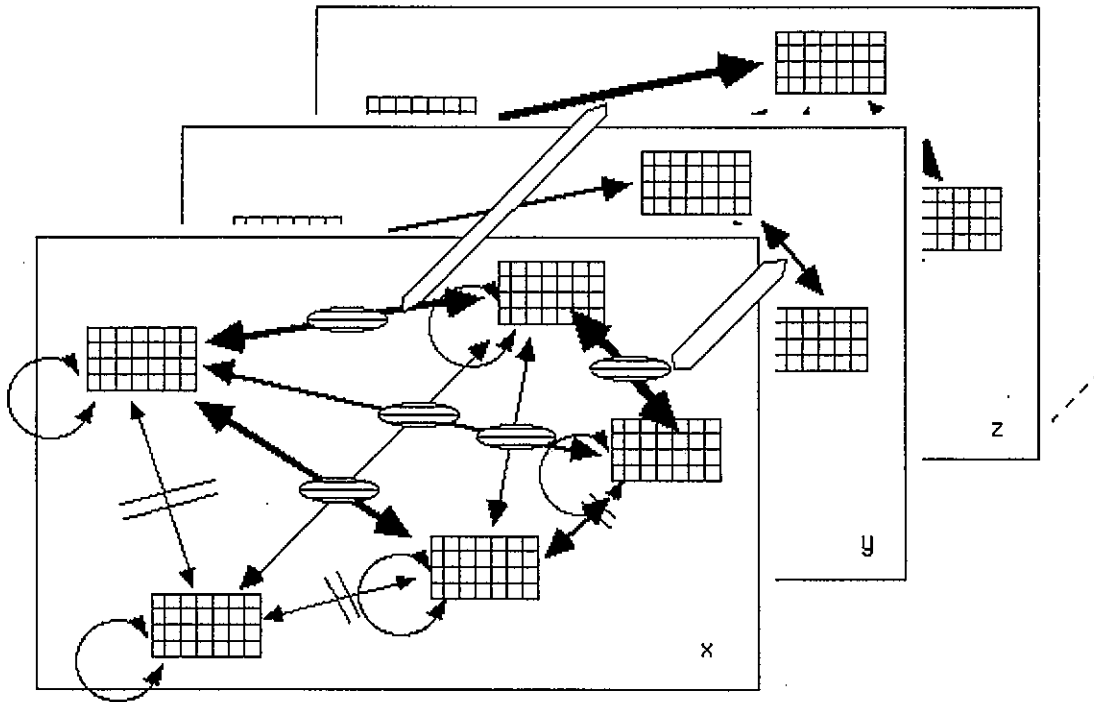
Legend:

x, y, z, ... :   type of flows

: matrix of conditions in nation by level and type

: inter and intra-national flows

: transmittance options (infrastructure)

- - ‖ - - :   barriers

: inter-flow linkage

Fig. 1.   Networks and linkages in an international migration system