Migration impact assessment:
A state of the art

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Peter Nijkamp
Jacques Poot

vrije Universiteit *amsterdam*

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Peter Nijkamp
Department of Spatial Economics, VU University Amsterdam, The Netherlands
p.nijkamp@vu.nl

Jacques Poot
National Institute of Demographic and Economic Analysis, University of Waikato, New Zealand
jpoot@waikato.ac.nz

1 Introduction

Migration is as old as humanity itself. Indeed it is no exaggeration to state that the evolution of human settlement and socioeconomic-cultural development was shaped by migration. Throughout history, individuals and families have relocated, sometimes over considerable distances, to seek new opportunities or escape current threats. While migration has always implied the crossing of real, or imagined, frontiers and the residing in communities that are in many ways different from one's birthplace, only after the emergence of the nation-state in the 19th century did a distinction between internal and international migration formally arise and, with it, the question of how the settlement of new arrivals – or the emigration from a country – impacted on a nation's citizens.

Most countries of the world are increasingly affected by international migration: either as senders of emigrants, receivers of immigrants, or in many cases as both. The composition of the migrant population is often very different from that of the host population in terms of demographic, cultural and socio-economic characteristics. Migrant settlement is world-wide also predominantly concentrated in specific 'attractor' regions, in particular in metropolitan agglomerations of the developed world. The extent to which foreign migrants exert positive or negative long-range effects on the local, regional or national economy is, however, an under-researched topic in many countries.

Broadly speaking, both sending countries and host countries have gained from two centuries of mass population redistribution (e.g. Hatton and Williamson, 2006) and cross-border mobility is presently greater than ever before. However, in recent years there has been a growing backlash against the notion that international migration at current levels provides a net benefit to nation states. Migrant-sending countries are concerned about a 'brain drain' of highly qualified workers, while receiving countries worry that the 'migrant absorption capacity' has been exceeded, leading to detrimental economic outcomes and rising social tensions. Of course, there are clear parallels with the other dimensions of unprecedented global economic

integration since the 1980s, namely trade and capital mobility, of which the benefits and costs are also hotly debated (e.g. Mittelman, 2000).

Amidst these sweeping global changes, a nation's policymakers are faced with having to take many explicit decisions regarding international migration: the granting of temporary work permits, defining the eligibility for citizenship, the provision of services to enhance migrant integration, the repatriation (or not) of asylum seekers, etc. Faced with a plethora of facts, opinions and emotions, it is of utmost importance that the process of policy formulation is grounded in a solid scientific evidence base. A broad societal debate on migration impacts needs a rational and evidence-based foundation in order to trace, monitor and assess the broader economic and societal impacts of immigration on the host country, region or city. This book discusses examples of a range of the scientific methods that are currently available to conduct Migration Impact Assessment (MIA). It also provides various case studies that may assist in verifying and quantifying the societal consequences of international migration. We define MIA as the integrated application of scientific tools to trace the broad socio-economic impacts of cross-border migration and related policies. Clearly, the impacts of migration go beyond the socio-economic realm and include cultural, environmental, political, spiritual and strategic issues. However, to cover all such considerations would be beyond the scope of a single book and the expertise of the contributors, who all have a background in the economic and spatial sciences. Thus, the book takes a solid socio-economic perspective on MIA.

There are clearly similarities between MIA and the much longer established environmental impact assessment (EIA), which is an assessment of the possible positive or negative impacts that a proposed project may have on the environment, taking account of natural, social and economic aspects (see, e.g. Wood, 2002). In both types of assessment, the issues are complex and the approaches multidisciplinary. MIA is in a sense broader than the economic tool of social cost-benefit analysis (SCBA). SCBA is a strategic assessment of all short- and long-term sacrifices and benefits that directly and indirectly accrue to society as a result of a major public intervention, initiative or external phenomenon. A social cost-benefit analysis does not value the financial significance of individuals or groups, but the economic meaning for society. However, in the case of MIA the assessment is usually of the impacts of past or current migration flows that may constitute a mix of skilled labour, families, refugees, students, retired persons and temporary workers, rather than the impacts of a narrowly defined specific policy. This makes SCBA of such broad migration flows neither meaningful nor practical. Nonetheless, examples of MIA of specific policies do exist, such as evaluation of the Recognised Seasonal Employer (RSE) scheme in New Zealand which was designed to assist employers in the horticultural and viticulture industries to meet major seasonal shortages in unskilled labour supply (see Evalue Research, 2010). As in the case of EIA, MIA can involve a mixture of pecuniary and non-pecuniary aspects. Simplified calculations of the income gain to all citizens from current immigration flows (referred to as the 'immigration surplus' by Borjas, 1999) can be made but do not provide a comprehensive assessment from which convincing policies can be derived. Certainly, MIA does not aim to 'monetize' individuals or groups of migrants, although MIA can include assessments of the relative contributions of various migrant groups to fiscal outcomes (e.g. Rubenstein, 2008; Rowthorn, 2008). To position

migration impacts in a broader strategic context of societal benefits it is useful to deploy a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis in which past, current and future effects are assessed from a broad perspective. The SWOT approach originated from the management literature and has been credited to Albert Humphrey at Stanford University. Section 13.3 of Chapter 13, the final chapter of the book, provides a simplified SWOT analysis on the basis of the evidence reported in this book.

Who are migrants?
The commonly accepted definition of an international migrant is someone who lives outside his or her country of birth for 12 months or more. Recent estimates suggest that the current total number of international migrants is about 3 percent of the world population of 7 billion people (e.g. World Bank, 2011). However, the migrant community may be a much broader concept that includes the second generation or even the third and subsequent generations that share a common culture and language. Additionally, the distinction between immigrants and foreign visitors is becoming blurred. Globalisation, partially fuelled by lower real costs of travel, communication and information exchange, has contributed to an unprecedented increase in short-term international mobility. Thus, the often cited statistic of about 215 million people living outside their country of birth, undersells the importance of transnational living and working. Ideally one would want to measure the propensity of any of the 7 billion global citizen to live abroad at some stage over their life course and to see how to this propensity is changing across generations. In the decades to come we may expect further increases in mobility due to technologically-driven further declines in the cost of long-distance travel and further global economic integration that will continue to impact positively on the likelihood of working or living abroad at some stage of the life course.

Of course there are major difficulties in obtaining statistically representative data on migration over the life course. Conceptually, the simplest way of measuring international mobility is in the frequency domain, measuring the number of border crossings made, from which there are a wide range of migration types possible. At the one extreme we have one migration in a life time, which is of course the historical or traditional type of migration. At the other extreme, we may think of daily commuting between a residence in the border region of one country and a job on the other side of the border, which is not strictly migration but which is a form of transnational living which – in terms of economic, fiscal and broader impacts on the two countries concerned – may not be dissimilar from migration.

Education abroad, temporary migration, seasonal work, tourists on working holidays, trans-national company transfers, foreign assignments, cross-border retirement, and commuting between multiple residencies can all be placed somewhere in the migration frequency domain. Clearly, the number of temporary migrants is growing rapidly, either as a complement or as a substitute to permanent migration.

A classification of impacts
In classifying the various types of impact, it is important to distinguish between a short-run and a long-run perspective. This distinction is not entirely clear cut and will vary with the context.

Moreover, short-run fluctuations can have permanent effects (a so-called 'path dependency'), such as a long-term disadvantage to migrants that may arise from their arrival in times of recession (e.g., Aydemir 2003). A distinction must also be made between macro-level and micro-level effects. The combination of macro versus micro and short-run versus long-run effects leads to a two-by-two classification that is helpful to categorise the various types of economic impact. This is shown in Table 1.

Table 1 about here

Additionally, it must be recognised that the impacts can be measured at various spatial scales as well. While MIA tends to be conducted most commonly at the national level, there are also studies that have attempted to measure the global impact of migration. Such studies conclude that, because migration is still so much more restricted than trade, a global freeing up of migration would have a much greater impact on global output than further trade liberalisation (see e.g. Walmsley and Winters, 2005). Within countries, the impacts may vary strongly spatially across regions, cities and even within city areas (Gorter et al. 1998). Yet most studies on international migration focus the attention on the national level, while impact assessments at local or regional scales are rarer. The predominantly national-economic focus is intriguing, as most problems – but also opportunities – associated with international migration are experienced at local or regional levels (see also Longhi et al. 2010a).

It should be noted that international migrants come from many different countries and form a heterogeneous group that is not evenly distributed over countries or regions, but adopts a self-selected residential and work location behaviour that leads to increasing socio-cultural and economic diversity, but also to socio-geographical networks and clusters (often called ethnic ghettos or precincts) in large agglomerations. Such clustering holds for all classes of migrants: migrants from former colonies, business migrants, labour migrants, lifestyle migrants (such as retired persons), international students and refugees. In some countries, policies are put in place that encourage dispersion (such as higher admission points being given to visa applicants who are willing to settle in peripheral regions), but such policies are usually not effective due to the freedom of subsequent internal relocation.

Migrants are characterized by a high degree of heterogeneity with respect to skills, education, age, gender, welfare position, cultural background, ethnicity, and motivation. Therefore it is no wonder that we do not only observe spatially diverse patterns of migrant departure and settlement, but also large differences in socio-economic impacts of foreign migrants. For example, in many large metropolitan areas immigration reinforces agglomeration. In contrast, rural areas may attract seasonal foreign workers to be employed in the primary sector, while many provincial towns may only be affected by immigration indirectly (through internal migration and general socio-economic mobility and equilibrium effects). The 'new geography of migration' offers ample evidence that it is not possible to give an unambiguous and general answer to the question whether or not international migration is beneficial for host and/or sending regions and countries. Nevertheless, the number of research questions related to local socio-economic impact assessment of international migration is vast.

A growing range of quantitative research tools has been developed and applied in order to offer a quantitative picture of the impacts of foreign migrants on national or regional welfare. These are outlined in the next section. A textbook review of economic impacts can be found in Bodvarsson and Van den Berg (2009).

So far this introductory discussion has taken the perspective of a host country. However, by definition each immigrant into a given country is also an emigrant from another country. The present book addresses predominantly the socio-economic impacts of immigrants on the host countries, regions and groups. It is clear that if sending and receiving countries would be very similar, we might expect equal but opposite impacts: a positive impact in a receiving country would coincide with an equally negative impact in a sending country, and vice versa. But if countries are very different the magnitudes of effects need not be the same, nor need they be in opposite direction. For example, an unemployed worker from a rural area in a developing country, who migrates to a city in a developed country, then finds employment and remits income, raises consumption in both countries. In general, we can categorize the impacts on sending countries in the same way as the impacts on host countries. Moreover, most countries these days are both senders and receivers of migrants (e.g. Poot et al. 2008). The issues listed in Table 1 therefore apply to both immigration and emigration. However, the issues that are prominent in public policy debate are often quite different when taking an outward migration perspective as compared with the inward migration perspective. This distinction is indicated in the table by labelling for each impact whether it is a prominent issue in a migrant-sending country, a migrant-receiving country, or both.

The classic perspective is that 'South–North' migration has benefitted the developed host countries but has been detrimental to the developing source countries. The main reason is that emigrants tend to be positively self-selected in terms of acquired skills and unmeasured ability – the co-called 'brain drain' (see, e.g., Bhagwati 1976). But unless the broader societal costs of the brain drain are large, there is no economic rationale for barring the movements of skilled workers to where their productivity, and therefore their real wage, is highest. Instead, policies concerned with international equity and development must address these distributional impacts. Moreover, the negative impacts of the brain drain have been challenged in recent years (see, e.g., Mayr and Peri 2008, Duncan 2008, UNDP 2009). These recent studies argue that the higher returns obtainable abroad to investments in education and training encourage a greater proportion of the work force to invest in human capital than otherwise, thereby generating a positive spillover in the source country labour market. Additionally, the injection of remittances into migrants' home countries can have positive impacts on growth, provided the remittances are channelled into investment activities (e.g. Giuliano and Ruiz-Arranz, 2009). Furthermore, the incidence of return migration and of circulation (i.e. repeated migration between the home and foreign country) is increasing. The return of diaspora can raise human capital levels and entrepreneurship in the source country; and also strengthen international relations.

Taking account of such beneficial impacts on sending countries, recent studies paint a very positive picture in which the global gains of further increases in migration vastly outweigh the costs. Goldin et al. (2011) argue that completely opening up borders could add as much as $39 trillion to world income over the next quarter century. Goldin et al. conclude that migration

may be the most effective tool for reducing global poverty. Such arguments, however, rather downplay the costs of the huge adjustments, structural changes and distributional impacts that would be associated with such radical liberalisation of the world's labour markets. As is the case with trade liberalisation, there are winners and losers in both sending and receiving countries in the short-run, even if long-run benefits accrue to the entire population. While those disadvantaged by the changes could be in principle compensated through public policies of redistribution, this is not a simple matter in practice. In the case of global trade negotiations this is clear from the frequent stalling of negotiations when country governments and negotiators are under pressure from domestic lobby groups that are concerned about detrimental impacts on the people they represent. Even though there is as yet no institutional mechanism for global migration negotiations (the General Agreement on Trade in Services (GATS) is limited to certain types of temporary migration only), significant resistance by some groups in society may also be expected to migration liberalization due to the distributional implications.

The present book aims to play a modest but important role in this context of assessing the costs and benefits of migration. Given that the socioeconomic impacts of international migration are wide ranging and complex, a debate regarding migration policies must be grounded in an evidence base obtained from solid scientific study. The migration debate stirs emotions and opinions, but progress cannot be made unless the available empirical evidence is dispassionately and transparently taken into account. This evidence base is clearly still under development and many questions remain unanswered. If this book provides an input into the current policy debate and encourages further careful research, it has achieved a laudable goal.

The next section reviews the range of analytical approaches that have been adopted in MIA in the past. The subsequent four sections provide selected evidence on the four types of impact that were differentiated in Table 1, respectively: short-run micro impacts, short-run meso/macro impacts, long-run micro impacts and long run meso/macro impacts. Clearly, it is impossible in a single chapter to comprehensively address all issues. Instead, the objective is to provide key references to evidence on the impact areas listed in Table 1.

The final section of the chapter provides an outline of the remainder of the book. Chapters 2 to 12 provide various North American and European case studies that quantify selected socio-economic consequences of migration for host societies and for immigrants themselves. In the final chapter of the book, chapter 13, we draw some broad conclusions from these studies and on the basis of this, conduct a basic SWOT analysis. We also identify the major gaps in current practice in MIA and point to the areas of research that can be most fruitfully developed to address such gaps.

2   Analytical Approaches of MIA

It is impossible to provide in one section of this introductory chapter on MIA a full review of all methodologies that have been used to identify and quantify the consequences of international migration. Instead, a brief review will be provided of nine commonly used approaches. For each section, references are given that will lead the reader to more extensive reviews (see also Vargas-Silva, 2012, *Handbook of Research Methods in Migration*).

(a) Meta-analysis

Economics remains to date predominantly a non-experimental science. Yet the main objective of empirical economic research is the search for causal relationships between economic phenomena, particularly relationships that inform on the likely outcomes of public policies. Because economic phenomena are interrelated in multiple, and often complex, ways, the multivariate regression model became the standard tool of the applied researcher as soon as computers became accessible and sufficiently powerful to invert large matrices around the middle of the 20th century (Morgan, 1990). The work of econometricians connected with the Cowles Foundation provided the first set of tools to address the issue of endogeneity of explanatory variables in the regression model. Even at present, the Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) regression models (with the latter substituting suitable exogenous instruments for endogenous explanatory variables) remain the most popular tools among applied researchers, although alternative methods such as Propensity Score Matching (PSM) (e.g. Caliendo and Kopeinig, 2008), natural experiments or randomised experiments (discussed later in this section) have become popular alternatives.

Hence the most common methodology in research on the economic impacts of immigration remains the regression model, discussed in all textbooks and included in all statistical software packages. A regression model may for example generate predictions of the form 'if x% more migrants are admitted, wages of workers similar to these migrants are expected to decrease by y%' (with the confidence interval a function of the estimated standard error). However, one problem with such predictions is that, once the policy has been implemented, the counterfactual (i.e. the outcome in the absence of the policy), will not be observed. Nonetheless, policies may vary across countries and periods, with regression models leading to predictions in each case. Without some form of randomization, e.g. assigning migrants by means of a ballot to some regions, but not to others, one can treat each of these regression models as a kind of experiment and look for 'typical' conclusions, conditional on observable features of each study. Meta-analysis is a quantitative form of synthesis of the literature that aims to find robust generalizations that ideally have sufficient predictive reliability to aid policy formulation. In the same way as the multivariate regression model remains the workhorse of primary research in economics, meta-regression analysis (MRA) has become an increasingly popular standard of summarising the empirical literature in economics (see Poot 2012 for an introduction to this field, and Sterne 2009 for software in *Stata*).

In MRA, all original regression analyses on a particular topic (referred to as *primary studies*) are collected through a literature search. The regression coefficients of interest (referred to as *effect sizes*) and the study characteristics are entered into a spreadsheet. To consider the distribution of these coefficients and to calculate an average value, the coefficients need to be of course in the same units of measurement. This is why elasticities are preferred because they are dimensionless quantities. The principle of 'pooling' the coefficients is that those with the smallest standard errors should get the greatest weight in calculating an average value. Assume that there are K studies and the effect sizes $b_1, b_2, ..., b_K$ are observed which correspond to the 'true' parameters $\beta_1, \beta_2, ..., \beta_K$. These effect sizes have estimated variances

$v_1, v_2, ..., v_K$. It is also assumed that there are P known variables $M_1, M_2, …, M_P$ that explain differences between studies (referred to as *moderator variables*) and are related to the effect sizes via a linear model as follows:

$$b_i = \beta_i + \eta_i = \gamma_0 + \gamma_1 M_{i1} + \gamma_2 M_{i2} + ... + \gamma_P M_{iP} + \eta_i \qquad (1)$$

in which M_{ij} is the value of the jth moderator variable associated with effect size i and the η_i is the disturbance term. The coefficients $\gamma_0, \gamma_1, …, \gamma_P$ are to be estimated. Because the effect sizes are heteroscedastic, this regression model should not be estimated by OLS. The simplest estimator to use is Weighted Least Squares (WLS), which is included in all statistical software packages. The weights variable is the vector of reciprocals of the estimated variances of the primary study effect sizes ($1/v_i$). A more sophisticated model takes into account that there is also unobserved heterogeneity across studies. The latter model, sometimes referred to as the Mixed Effects (ME) model can be estimated by the command *metareg* in *Stata* (see Sterne, 2009). In recent years various meta-analyses have been conducted of research on the economic impacts of migration. Several examples are given in the remainder of this chapter.

(b) Time-series analysis
Historically, time series of economic data were commonly used to construct macroeconomic models of the economy. Such models consisted of a range of equations describing economic behaviour, combined with equations that described identities of relationships between economic variables. The classic example is the model of the US economy, developed by Klein (1950). Many such models have been developed, often with hundreds or thousands of equations. After the critique by Lucas (1976) that the structural equations of a model change once economic agents anticipate that governments use the model for their decision making, the popularity of this kind of modelling decreased, but – incorporating theoretical and econometric advances – modern econometric models remain the backbone of economic policy advice. Such models often include equations representing the labour market and, consequently, they can be used for MIA through incorporating a particular exogenous migration 'shock'.

A subset of such time-series models, Vector Auto Regression (VAR) models, is specified under the assumption that little is known *a priori* about how economic variables are influencing each other. The VAR model simply assumes that the current outcomes of all variables are a function of the path of past outcomes of all variables. This a-theoretic approach can be extended by incorporating prior beliefs about such interrelationships in so-called Bayesian VAR (BVAR) models. Because VAR and BVAR models are essentially a means of extrapolating from the past to the present, such models are particularly popular for forecasting. Examples of forecasting of migration flows are given by Gorbey et al. (1999) and Bijak (2011).

Time-series models are also used to test the causal direction of economic relationships. A time series is said to Granger cause another time series if prediction of the latter series is statistically improved by including information on the past of the former variable (Granger, 1969). Granger causality has been extensively applied in MIA, for example to the question whether immigration causes unemployment (Islam, 2007; Withers and Pope, 1985) or whether

immigration increases economic growth (Horley, 2006; Poot, 1993). A common finding from these Granger causality tests is that the causality runs in both directions: migration Granger causes economic conditions, but economic conditions also Granger cause migration. Interestingly, the impact of economic conditions on migration is often statistically stronger than the impact of migration on economic conditions.

(*c*) *Microdata regression models*
Due to the very rapid information and communication technology (ICT) development of recent decades, the amount of information available for MIA has become vast. Although population censuses are becoming less frequent, or are replaced altogether by other sources of population data, the number of representative sample surveys has grown hugely, again aided by ICT developments. Moreover, the computerisation of administrative databases provides another rich source of data. Provided that there are common identifiers, data from various sources can also be linked. Such technological developments increase concerns about privacy and confidentiality but, provided institutional arrangements are put in place to preserve confidentiality, MIA research can nowadays draw from a 'flood of numbers' (Heckman, 2001).

Three strands of research have been developed in MIA that use microdata extensively. The first is the so-called 'area approach', the second is the 'production function' approach and the third is the 'economic integration of migrants' approach. We will outline each briefly. The vast majority of studies estimating the impact of migration on economic outcomes use the 'area approach'. They estimate a multivariate regression model in which the outcome variable of interest is modelled as a function of, among other variables, a measure of migration (m_{jt}):

$$y_{jt} = \beta\, m_{jt} + \mathbf{x}_{jt}{}'\,\alpha + \varepsilon_{jt} \tag{2}$$

where y_{jt} is a measure of the impact of interest, with j referring to a geographical area and t to the period considered (e.g. the average wage of individuals in area j, the unemployment rate in j, the average house price in j, etc.; with area averages calculated by means of micro-data). The measure of migration is often the stock of migrants, or the share of migrants in that particular area population, or a change in one of these two variables (i.e. migration flows). Furthermore, $\mathbf{x}_{jt}$ is a vector of observations on covariates which might vary widely between studies. The coefficient of most interest in MIA is β, with α a vector of other coefficients. The error term which captures unobservables and random variation is ε_{jt}. The area approach exploits the fact that migrants are predominantly drawn from a limited range of source areas and settle in a limited number of destinations. Equation (2) is usually estimated in host countries but could in principle also be estimated in sending countries (with m_{jt} then measuring e.g. the stock of expatriates originating from area j and living abroad at time t).

Estimates of β, obtained by regressions of the type specified in Eq. (2), measure an effect that is assumed to be time and space invariant. This assumption is often left untested. Moreover, researchers have in the past often ignored the fact that the data are essentially in the form of a spatial panel in which there may be spatial autocorrelation that may bias estimates obtained with non-spatial methods. In future MIA, spatial econometrics should be applied to a

greater extent (see e.g. LeSage and Pace 2009 for an introduction). While the non-random distribution of migrants across areas is the means by which the impact can be assessed, a source of possible bias is the fact that immigrants will be attracted to prosperous area while emigrants are unlikely to leave such areas. Without controlling for endogeneity of migration, the estimated impact is likely to be biased. This necessitates the use of instrumental variables (IV), that are correlated with the migration measure but that may be assumed to have no impact on the outcome measure (see Lozano and Steinberger (2010) for a review of IV methods). In the case of immigration, a common instrument is the 'migrant stock' at some time in the past under the assumption that immigrants' locational choice might depend more on historical patterns (that generate clusters and networks) than on current economic pull factors (van der Gaag and van Wissen 2001).

The political debate on negative economic impacts of immigration is partly driven by the belief that immigrants compete with natives in markets and, as predicted by the neoclassical model, are then bound to generate negative externalities in terms of opportunities for residents. The issue of the extent to which immigrants are substitutes or complements to natives, earlier immigrants with the same characteristics, or different types of immigrants, remains a challenging empirical issue. A low degree of substitutability between natives and immigrants may be one reason why the literature has failed to find a large negative labour market impact of immigration (see, e.g., Longhi et al. 2010a). The production function approach makes explicit assumptions about the extent of substitution between immigrants and native born workers, as well as the extent to which an increase in labour supply due to migration leads to additional capital being available. Essentially, studies such as Borjas (2003) assume that immigrants and natives in the same education and experience group are perfect substitutes and that the impact on capital is very limited. In contrast, studies such as Ottaviano and Peri (2010) assume that immigrants and natives are imperfect substitutes and that a larger labour force due to immigration raises the rate of return to capital which in an open economy leads to an influx of capital. With greater substitution possibilities but overall constraints on the size of the economy, the production function approach predicts a 'crowding out' effect of deteriorating outcomes for the native born, whereas with limited substitution possibilities and greater resources, the crowding out effect is very small or non-existent.

One aspect that has not been taken into account much in the consideration of substitutability between immigrants and the native born population is the change in labour market characteristics of immigrants over time. It is plausible that because immigrant skills are often not fully transferable to the host labour market upon arrival (e.g. due to language difficulties or different work practices), immigrants become closer substitutes for the native born with increasing years of residence in the host country. This process is referred to as economic integration of migrants. The core question with respect to integration is to what extent any difference in economic outcomes between migrants and the native born remain even in the long-run and whether such long-run differences, if they exist, remain after taking into account all the observable factors that determine outcomes. Full economic integration is achieved when immigrants and native born people with the same human capital and working in the same local labour market may be expected to have the same labour market outcomes in the

long run. The literature on this issue started with the seminal US study by Chiswick (1978). This study and many subsequent ones find that, in a cross-section of immigrants, those with the least time in the host country experience the largest gap in earnings between them and comparable locally born workers. The gap reduces with increasing years in the host labour market and there is an equalising for some groups.

A considerable debate has emerged in the literature as to whether the observed earnings catch-up in a cross-section of people (i.e., those in the host country longer have better outcomes) is due to an improvement in labour market outcomes with increasing years of residence in the host country, or simply due to a deterioration in the 'human capital' of successive cohorts of immigrants. The latter would lead to observing a spurious catching up in a cross-section of data when recent immigrants have lower abilities and skills than the recent immigrants in earlier periods. Borjas (1999) reviewed the evidence that this has been the case at least in the US where more recent cohorts of immigrants were lower skilled than directly comparable earlier cohorts. Spurious earnings catch up observed in a cross section can also be due to selective re-migration of the least successful immigrants.

Formally, let the subscript τ ($\tau = 1, 2, \ldots, T$) refer to a cross-section. An individual i is observed in cross-section τ in calendar year $t_{i\tau}$. For immigrants, the outcome of interest $z_{i\tau}$ can be explained by:

$$z_{i\tau} = \mathbf{x}_{i\tau}' \boldsymbol{\varphi}_\tau^m + \delta^m a_{i\tau} + \alpha y_{i\tau} + \beta_c c_i + \theta g_i + \sum_{\lambda=1}^{T} \gamma_\lambda^m d_{i\lambda} + \varepsilon_{i\tau} \tag{3}$$

and for native born persons, the outcome equation is:

$$z_{j\tau} = \mathbf{x}_{j\tau}' \boldsymbol{\varphi}_\tau^n + \delta^n a_{j\tau} + \sum_{\lambda=1}^{T} \gamma_\lambda^n d_{j\lambda} + \varepsilon_{j\tau} \tag{4}$$

in which:

$\mathbf{x}_{i\tau}'$ and $\mathbf{x}_{j\tau}'$ are vectors of observed personal characteristics that influence outcomes;

$\boldsymbol{\varphi}_\tau^m$ is the vector of the coefficients of these characteristics for immigrants (note that these can vary over time);

$\boldsymbol{\varphi}_\tau^n$ is the vector of the coefficients of these characteristics for the native born (note that these can be different from those for immigrants);

δ^m is the return to potential labour market experience of immigrants;

δ^n is the return to potential labour market experience of the native born (note that this return can be different from that for immigrants);

$a_{i\tau}$ ($a_{j\tau}$) is the observed age of person i (j) in cross-section τ, minus years of education minus the school entrance age (this proxies lifetime experience in the labour market);

α is the coefficient that measures the rate of improvement in outcomes (economic integration) for each additional year that an immigrant is in the host country;

$y_{i\tau}$ is the observed number of years immigrant i has been in the host country in cross-section τ;

β_c is the coefficient that measures the effect on outcomes of immigrants arriving in calendar year c (referred to as the cohort effect);

c_i is the observed calendar year in which immigrant i arrived in the country;

θ is the coefficient that measures the effect of age at the time of arrival in the country;

g_i is the observed age of immigrant i at the time of arrival in the country;

γ_λ^m is a period (business cycle) effect for immigrants (an average effect on outcomes for all immigrants in cross-section τ);

γ_λ^n is a period (business cycle) effect for the native born (note that this effect can be different from that for immigrants);

$d_{i\lambda}$ ($d_{j\lambda}$) is a dummy variable which is equal to 1 for person i (j) when $\lambda = \tau$ and 0 otherwise;

$\varepsilon_{i\tau}$ ($\varepsilon_{j\tau}$) is a random error that reflects that part of the outcome for person i (j) that is unexplained by the model (conventionally linked to unobserved innate ability, attitudes to risk, but also possible discrimination).

Estimation of Eqs (3) and (4) must take into account that there are two mathematical identities built into these equations. The first is that age at the time of migration is current age minus number of years in the host country. The second is that the number of years in the host country also equals the calendar year in which cross-section τ is observed minus the calendar year in which the immigrant arrived. Because of these identities it is impossible to estimate the regression equations (3) and (4) without further assumptions. Borjas (1999) reviews various possible assumptions. Models of economic integration, particularly with respect to earnings, have been estimated extensively with microdata in many host countries (see e.g. Duleep and Dowhan 2008a for a review).

(*d*) *Fiscal impact analysis*
One issue that is often central in the migration debate is the impact of migration on the public sector. Like any other residents, immigrants use public services, pay taxes, and may sometimes be eligible for social security payments. This leads to the question of how a particular migration policy impacts on the size and composition of government revenue and expenditure and on the net financial position of the public sector. The simplest methodology for such fiscal impact analysis is an accounting framework that disaggregates the public sector accounts into revenues obtained from, and expenditures incurred by, the demographic groups that make up the population. Next, per capita amounts are calculated. For example, one can calculate average public education expenditure incurred by each ten year old enrolled at publicly subsidised schools, the average amount of per capita public health spending on females aged 70, average income tax paid by each 50 year old male with a university education, etc. Then, when the impact of a change in population due to a migration policy is calculated, the per capita amounts are applied to the additional population. This methodology can also be applied to emigration. The fiscal impact of emigration can be assessed by considering the counterfactual of what the fiscal position would have been without the emigration occurring. Desai et al. (2009) apply this idea to the emigration of high-skilled Indian workers to the US.

Fiscal impact analysis as described above implies effectively a linear relationship between population size of each demographic group (defined by age, sex and other characteristics) and the corresponding public sector activity. Clearly, a crucial issue is the extent to which marginal costs and revenues differ from average ones. With pure public goods, such as defence, additional population may not lead to additional expenditure. In the case of infrastructure, however, additional population may generate overutilization and congestion that necessitates additional investment. Assumptions need to be made about for which categories additional expenditures may be more or less than proportional.

Besides calculating a national impact, fiscal impact analysis can also focus on the redistributional aspects: certain groups are net contributors to the fiscal accounts, while others are net recipients. The fiscal impacts literature suggests that, by and large, the fiscal impact of immigration is positive but small: immigrants add a little more to tax revenue than to government consumption or social security payments. Examples are the assessment of the fiscal costs and benefits of migration of the eight 2004 accession countries to the EU (Dustmann et al. 2009) and the fiscal impact of New Zealand immigration (Slack et al. 2007).

The main cause of the positive net fiscal impact is the age profile of immigrants. They tend to be relatively young, and often also single. Given the very strong links between age and the major public expenditure items of health and education, immigration tends to increase education expenditure (when migrants bring children) and lower health expenditure, with the net balance being a reduction in total expenditure. On the income side, a high labour force participation rate of migrants increases the impact on income tax. Moreover, all migrants pay consumption taxes. The net effect is often a fiscal surplus, which tends to be larger for groups of higher skilled migrants.

However, it is important to also take a life course perspective rather than just a single year or 'snapshot' perspective. Studies of the latter type can be misleading because they do not take the life course of migrants and their offspring into account. Lee and Miller (2000) note that 'the only meaningful calculation is longitudinal, tracing the consequences of an immigrant's arrival through subsequent years, and taking full account of all the immigrant's descendants' (p.351). Taking such a longitudinal perspective, Lee and Miller (2000) find with US data that the Net Present Value of the fiscal impact of an additional immigrant (i.e. the marginal net fiscal benefit) starts out negative, then turns positive within the first 25 years and keeps on increasing from then on.

Because different cohorts of migrant arrivals face different sets of fiscal policies, a popular approach to studying the fiscal impact is the methodology of *generational accounting* that was developed to consider the economic impact of population ageing and the net fiscal contribution of various generations facing different tax and social security arrangements. Bonin and Patxot (2004) provide an overview of the methodology. Auerbach and Oreopoulis (1999) find that because new immigrants represent a larger fraction of future generations than of present ones, shifting the burden of net public expenditure onto future generations also shifts it relatively onto new immigrants. Thus, immigration can be used in principle as a tool for reducing public debt. However, Auerbach and Oreopoulis (1999) argue that the impact of

immigration on fiscal balance is rather small, so that immigration should be viewed as neither a major cause of budget deficits nor a solution to it.

The demographic accounting approach can also be used to extend the impact of immigration from the fiscal accounts to the broader national accounts. This methodology is referred to as National Transfer Accounting (NTA, see Lee and Mason, 2010). The NTA methodology has been designed with particularly the issue of population ageing in the developed world in mind but can also be applied to migration issues. A key feature of NTA is that it shows that midlife adults are net savers, while children, young people and the retired are net spenders. The midlife group transfers resources to the next generation (their children) and to the previous generation. However, a major distinction is that resource transfers to the young are predominantly private (within households) while resource transfers to the elderly are predominantly public (through social security and health spending). The NTA approach would highlight the short-term public benefit of net inward migration of skilled midlife migrants. However, if the fertility rates of migrants converge on the sub-replacement rates of the host population, a temporary increase in migration to relieve the fiscal pressure on providing pensions could lead to even greater pressure in the future once the cohort of migrants is itself in retirement.

Finally, it should be noted that fiscal impact analysis as discussed above is a mechanical rather than behavioural approach. If various behavioural responses or feedback mechanisms are to be included, fully specified economy-wide econometric models are needed, such as the time-series models discussed previously, or Computable General Equilibrium (CGE) models. For example, Storesletten (2000) simulated immigration scenarios with a CGE 'overlapping generations' model. An alternative is the 'bottom up' approach of microsimulation. Both types of approaches are discussed in what follows.

(e) Computable General Equilibrium models
Computable General Equilibrium (CGE) models are computer models that can simulate the myriad interactions between the various sectors of the economy. The basic principle is that of market equilibrium: given available resources and descriptions of firm behaviour and consumer behaviour, the model calculates the allocation of resources and the associated set of prices that are consistent with the equality of demand and supply in all markets (see Dixon and Parmenter 1996 for an overview). Such models have a long tradition that goes back to the work of Johansen (1962). CGE models require a significant amount of disaggregated data, for example on the input-output structure of the economy. The parameters are calibrated or derived from other empirical studies rather than estimated econometrically.

CGE models have been particular popular for the analysis of trade liberalisation, at the country level but also globally. Such models can also be used to assess the impact of removal of restrictions on migration. Walmsley and Winters (2005) use a CGE model to calculate the impact of removal of restrictions on temporary movement of workers, such as could be implemented under GATS mode 4. They find that significant gains in global GDP may be expected. Recent studies that use CGE simulations to calculate the impact of certain immigration levels on national economies include Nana et al. (2009), who focus on

immigration scenarios for New Zealand, and Baas and Brücker (2010) who calculate the impact of East-West migration into Germany and the United Kingdom.

CGE models always contain more variables than equations, requiring some variables to be set outside the model (referred to as the exogenous variables, with the remainder being called endogenous). The choice of which variables are to be exogenous is called the model 'closure'. Variables defining the technology of production, consumer tastes, and the policies of the government (such as tax rates and public spending) are usually considered exogenous. One of a CGE model's strengths is that this kind of modelling allows a detailed description of the immigration 'shock' to be analysed, taking account of immigrant gender, age, occupation, experience, ethnicity, and so on. Also, by using parameters derived from other empirical research (e.g. by means of meta-analysis) the latest research findings can be fed into the model. Another strength is that the fiscal impact can be calculated beyond the 'first round' accounting approach that was discussed in the previous sub-section to assess the marginal tax revenue generated and marginal fiscal expenditure incurred from a group of new migrants. Finally, CGE models are particularly suited to 'what if' scenario simulations and do not require forecasting of the path of the economy when outcomes are calculated relative to a 'base case'.

Nonetheless, CGE models also have various weaknesses. First, results are very sensitive to the 'macro closure': the outcomes at the macro level are strongly dependent on the assumptions made. Particular issues of concern are assumptions about the aggregate level of new investment, the total stock of capital and natural resources, and the absence of modelling of monetary effects. Moreover, CGE models are not well suited to model endogenous technical change or to deal with activities that are non-market based. Many CGE models calculate a new equilibrium after some economic shock, but they do not trace the path from the initial equilibrium to the new one. Thus, such models are comparative static rather than dynamic. Economic agents (firms and households) in static models do not have forward looking expectations and their decision making takes place in a one-period setting. Models that relax these restrictions are called dynamic or inter-temporal CGE models (see Heer and Maussner, 2009 for an overview). An example in MIA is Chang (Chang 2004). It should be noted that fully dynamic CGE models remain computationally burdensome and can only be simulated with a high degree of aggregation (i.e., with just a few sectors and skill groups or occupational groups).

(f) Agent based modelling and microsimulation
The MIA methodologies discussed above can be generally thought of as macro or meso-level approaches that assess the impacts of migration in a top-down fashion. Given the increase in availability of very detailed micro-level data in recent years, it is not surprising that there is a growing interest in microsimulation, which models the impact of policies on individuals and households in a bottom-up fashion. Microsimulation models do this by means of very detailed descriptions of how a particular economic agent (individual, household or firm) would respond to particular policy changes. Extensive reviews can be found in Zaidi et al. (2009). Microsimulation models have become particularly popular to analyse the distributional impact of changes in government programmes. The method has therefore some overlap with the

generational accounting referred to earlier but operates at an even more disaggregated level. Like fiscal impact analysis, microsimulation can be static (i.e. referring to changes in one period only) or dynamic (tracing changes over time). The data demands for dynamic microsimulation are large because for every profile of characteristics of an individual, assumptions must be made of the likelihood of the transition to a different profile of characteristics in a future period.

There have been some applications of microsimulation in MIA. In order to assess demands for social security in the US in the future, Duleep and Dowhan (2008b) use microsimulation to forecast the future earnings of US immigrants. The parameters for such microsimulation come from regression analysis of the economic integration of immigrants by means of microdata (reviewed earlier in the chapter). Another example of microsimulation in MIA is given by Rephann and Holm (2004), who develop a dynamic spatial microsimulation model of immigration in Sweden. This study concludes that the levels of immigration experienced in Sweden had only very modest impacts on the economy and the labour market.

Related approaches are agent based modelling and modelling with cellular automata. In both cases, the emphasis is particularly on the spatial distribution of economic activity or of economic agents. The distinction between agent based modelling and cellular automata is that the former simulates the behaviour of individuals facing a set of circumstances and assumptions about behaviour (see Farmer and Foley, 2009, for a brief introduction), whereas cellular automata take the spatial unit as the reference point and simulate how activities at any particular location may change over time (e.g, Torrens and O'Sullivan, 2001). These methodologies have as yet had little application in MIA, except in the context of spatial segregation in urban areas. Following the classic work of Schelling (1971), agent based modelling has been used to see how ethnic clusters evolve over time (see e.g. Omer, 2005).

(g) Natural experiments
One of the main difficulties in MIA is to obtain empirical estimates of the impact of immigration on a range of socio-economic outcomes while fully accounting for the fact that migration is an endogenous process, with migrants' propensity to change location and their choice of destination influenced by socio-economic conditions. There is very little distinction in this respect between internal and international migration. In most countries, the decision to leave the country is a basic human right equal to that of leaving a region. In terms of immigration, it is true that temporary and permanent residence visas are influenced by policies, quotas and border controls but there can be considerable undocumented migration and, moreover, return migration is again a free choice. Consequently, the current stock of migrants in most countries is endogenous.

However, there are situations in which migration levels change due to exogenous events, such as wars, natural disasters or major policy changes. Measuring the impact of such a specific exogenous shock is referred to in the literature as a natural experiment (Meyer, 1995). The most commonly cited MIA using a natural experiment is Card's (1990) study of the 1980 impact of a sudden increase in Miami's labour supply due to an influx of Cuban immigrants when restrictions of emigration from Cuba were temporarily lifted. This is referred to as the

Mariel Boatlift (on April 20, 1980, Fidel Castro declared that Cuban nationals wishing to migrate to the US could leave freely from the port of Mariel). By using a difference-in-differences (DID) estimator, Card (1990) concluded that this large immigration shock, which increased Miami's labour force by 7 percent almost overnight, had no significant impact on Miami's native labour market outcomes. Mathematically, the DID estimator in its simplest form calculates

$$DID = (T_a - T_b) - (C_a - C_b) \qquad\qquad (5)$$

where T_a is the measured outcome after the exogenous shock, T_b is the outcome before the shock (i.e. the 'treated' case) and C_a and C_b refer to corresponding outcomes at another location that was not affected by the exogenous shock (i.e. the 'control' case). This methodology requires the strong assumption that the only way in which the two cases differ is the exogenous shock under consideration. While regression analysis can account for inter-area differences in other observable exogenous factors, the observed 'after' outcome in the treated case may of course be due to a local but unobserved shock occurring there at the same time. Similarly, there may be unobserved changes specific to the control case. Nevertheless, the natural experiment has become a popular method of MIA particularly with respect to labour market impacts. Examples from the last decade include MIA of labour market impacts due to the immigration of Russian Jews into Israel (Friedberg 2001; Cohen-Goldner and Paserman 2006); the influx of immigrants into Western Europe from the former Yugoslavia (Angrist and Kugler 2003); and the influx of immigrants from Central America to the US following hurricane Mitch (Kugler and Yuksel 2008).

Another means of identifying impacts is provided by government policies that aim to achieve dispersion of government-assisted newly-arriving migrants, such as refugees. The common objectives for such a policy are facilitation of economic integration and discouragement of ethnic enclaves. Such policies have been adopted particularly in European countries where access to government assistance (e.g. housing) may be conditional on a permit to reside in a particular area. For example, Glitz (2011) considers the local labour market impact of ethnic Germans who before the fall of the Berlin Wall lived in the former Soviet Union and the Warsaw Pact countries and subsequently migrated to an assigned region in Germany.

The methodology has also been applied to other types of impacts. For example, Gould et al. (2009) investigated the impact of the presence of immigrant children in elementary school classes on the long-term academic outcomes of native students in high schools. They find a negative spillover effect. Saiz (2003) used the Mariel Boatlift to study the impact of an immigration shock on housing rents. This natural experiment represented an exogenous increase of 9% in Miami's renter population in one year. Saiz showed that rents increased 8% more in the Miami metropolitan area than in the rest of metropolitan Florida and two other groups of comparison cities. Finally, natural experiments can of course also be used to assess the impact on migrant sending communities (see McKenzie and Yang 2010 for several examples).

(h) Randomized trials

Increasingly, economists are looking for real world phenomena that would permit them to use the research designs of experimental sciences. This can be a potentially promising development for MIA. For example, if migrants could be randomly allocated to communities, this allocation process could be considered a treatment and the impact of the treatment could be measured by a DID estimator. Some of the natural experiments mentioned earlier are close to such a set-up although, for example, a refugee settlement programme is unlikely to assign settlement locations randomly (but instead would take into account existing networks, characteristics of the migrants, etc.). Historically, large scale experiments in the social sciences have often been considered impractical, unethical or unconstitutional. However, in recent years there has been an increasing interest in analysing data that result from lottery-based immigration policies or from randomised control trials in field experiments. These have been particularly applied from the perspective of (developing) sending countries (see McKenzie and Yang 2010 for a review).

Such randomized trails can be useful to control for migrant self-selection effects. McKenzie et al. (2010) exploit a random ballot in Tonga that provides an opportunity for 250 individuals per year to migrate to New Zealand. They can then compare the socio-economic outcomes of those who won the lottery and migrated directly with those who applied but lost the lottery (and therefore were unable to migrate). The impact on other family members in the sending country can also be assessed. Gibson et al. (2011) use the Tongan migration lottery program to show that the overall impact on households left behind is rather negative, at least in the short run, in terms of resource availability. McKenzie and Yang (2010) also review two field experiments of saving behaviour of immigrants in the US.

One problem with migration policy lotteries and field experiments is that those that are available for analysis often concern rather small groups. The external validity of small scale cases remains an open question. Interestingly, the US Green Card lottery, with more than 13.6 million applicants in 2010 and about 100,000 winners (of whom half are expected to migrate) could potentially provide data for large scale randomized trial policy analysis, but has not yet been analysed in this way (McKenzie and Yang, 2010).

(i) Qualitative and mixed methods
All methods reviewed so far in this section are quantitative. A broadly-based multidisciplinary MIA should ideally also be informed by the finds of qualitative research or mixed methods approaches. A review of such methods that include *inter alia* in-depth interviews, focus groups, content analysis, ethnography and case studies is beyond the scope of this chapter. For an overview, see e.g. Hesse-Biber and Leavy (2011). In MIA qualitative approaches commonly complement quantitative approaches in the study of ethnic entrepreneurship (see Nijkamp et al. 2010 for an example).

3 Selected Evidence on Migration Impacts: Short-run Microeconomic Impacts

It is impossible in the context of the opening chapter of a book on MIA to fully review all the available evidence on socio-economic impacts of migration. Instead, we either report on the broad conclusions of meta-analyses where these have been conducted or, where meta-analytic

evidence is not yet available, refer to a narrative survey on the topic, or to one or two studies that may be considered as typical of the work in that area. The structure of this section and the next three sections follows Table 1. We first consider short-run impacts (say, up to 2 years) then consider the medium term to long term (from 3 years to a generation or longer). Within each time frame, we first consider microeconomic issues, followed by macroeconomic perspectives. While Table 1 indicates which issues are relevant in both sending and receiving countries, in this book we focus predominantly on host countries and therefore, also due to space constraints, generally do not cite evidence from studies on migrant-sending countries. Some econometric models calculate the effects on sending and receiving countries simultaneously. For example, Barrell et al. (2010) use NiGEM, a large estimated quarterly model of the world economy, to assess the migration impact of A8 countries joining the EU in 2004 on both the sending and host countries.

Wages and employment
This is undoubtedly the most prominent research topic in MIA. Several meta-analyses therefore provide a synthesis, and often broad consensus, of the empirical literature. Longhi et al. (2005) focus on the impact that immigration has on wages of natives and earlier immigrants by comparing estimates from 348 regression equations, appearing in 18 articles published from 1982 to 2003, covering a range of countries (although the majority of estimates come from the US). Longhi et al. (2005) conduct a MRA in which the dependent variable is the estimate of the impact of immigration on wages, as published in the literature, and the moderator (independent) variables are dummies that summarise the main characteristics of the regressions that produced those estimates. They find that although the range of estimates of the percentage change in wages resulting from a 1 percentage point increase in the share of migrants in the population is very wide (in their sample from −5.35 to +4.46), there is broad consensus in the literature that the impact of immigration on wages is small. The unconditional average of the 348 estimates is only −0.1, which implies that a one percentage point increase in the share of immigrants in the population would lower wages of the native-born population by about 0.1 percent.

With respect to employment impacts, Longhi et al. (2008a) systematically summarise 165 estimates of the impact of immigration on employment, appearing in 9 articles published from 1997 to 2005. The unweighted average of the 165 estimates of the impact of immigration on employment translates into a finding that a one percentage point increase in the share of immigrants in the population lowers employment of the native-born population by about 0.2 percent. Hence, the employment effect appears on average to be somewhat greater than the wage effect, which may be linked to the evidence in the 9 articles originating predominantly from European countries where wages are rather less flexible than in the US.

Longhi et al. (2010a) then focus on studies that estimate wage and employment effects simultaneously. They systematically summarise 7 articles published between 1991 and 2006 that do so. These 7 articles published 129 paired estimates of wage and employment impacts, all using data on local areas and exploiting the regional variation in the share of immigrants in the population. A simultaneous equations MRA is estimated. This study again confirms that the

observed impact of immigration on local wages and employment is very small. Using a weighted average with weights determined by the precision of the estimates, a 1 percentage point increase in the share of immigrants in the local labour market of a typical host country decreases wages of the native born by 0.029 percent and decreases employment of the native born by 0.011 percent. The magnitudes of the elasticities are therefore even smaller than those found in Longhi et al. (2005, 2008a) which included a larger number of national level estimates. This is not surprising since localised effects are likely to be smaller than national effects, for example because native-born workers may move out of the area in which migrants settle, thereby offsetting the 'supply shock'. This meta-analysis also suggests that the impact of immigration on wages is less negative in the EU than in the US, while the impact of immigration on employment is larger in the EU. These findings are consistent with the earlier meta-analyses and with the general idea that in labour markets with relative rigid wages, adjustments to exogenous shocks may be primarily in terms of employment.

One of the problems with the above-mentioned meta-analyses is that the number of primary studies that can be combined is rather small. This is due to the wide range of econometric specifications adopted in the literature. If comparisons are made of the statistical significance of labour market impacts rather than the magnitude of these, a much larger number of studies can be 'pooled'. Longhi et al. (2008b) compare 1,572 estimates of the impact of immigration on different aspects of the labour market, collected from 45 articles published between 1982 and 2007. Of these, 854 are estimates of the impact of immigration on wages; 500 on employment; 185 on unemployment; and 33 on labour force participation. They find that about half of the 1,572 estimates of the impact of immigration are not statistically significant, reconfirming that the impacts on the national and local labour markets are either hard to detect or often very small.

Relative wages between and within migrant and native groups
The conclusions regarding relative wages are strongly dependent on the research design, particularly with respect to the specification of the production function. If a certain group of new migrants is assumed to be a close substitute for an earlier group of migrants or a specific group of native born workers, an additional inflow of such migrants would lower wages of the incumbents. Alternatively, the extent of substitution may be estimated from the data rather than by assumption. Maré and Stillman (2009) provide an interesting comparison of different production function specifications estimated with New Zealand microdata. Essentially the results suggest that migrants of particular skills are complements rather than substitutes to many groups of workers in the host economy. The only workers who may experience a 'crowding out' effect of new arrivals are earlier migrants with exactly the same skills. The New Zealand evidence is consistent with meta-analytic evidence reviewed in Longhi et al. (2010b).

Job search and unemployment
If adjustments to labour markets are relatively slow due to information asymmetries, search costs, imperfect competition, etc., an immigration shock may temporarily increase

unemployment. In the presence of hysteresis, whereby unemployed workers have lesser employment opportunities in the long run, such effects may persist. However, the meta-analytic evidence reported by Longhi et al. (2008b) suggests that of 185 estimates of unemployment effects, close to 80 percent were statistically insignificant. Hence there is little evidence that immigrants take jobs away from natives. To our knowledge, there is no direct evidence yet on the impact of new immigrant arrivals on the job search of the native born. A theoretical model by Chapman and Cobb-Clark (1999), calibrated on Australian data, suggests that immigration tends to increase the overall employment prospects of natives. Frijters et al. (2005) conclude with UK labour force survey micro data that, while immigrant job search is often less successful than that of natives, immigrants do not generally appear to compete with natives for the same jobs.

Shortages in specific labour markets
In many countries, migration is used as an instrument to relieve a shortage of workers in specific labour markets. Such shortages may arise due to structural imbalances in the labour market associated with imperfect information, inadequate training, mobility costs and inflexible wages. Shortages often occur at both ends of the skills spectrum: at the low end in seasonal agricultural work, mining, cleaning, housekeeping, etc.; and at the high end in executive, professional, technical or teaching positions. Interestingly, resolving shortages at both ends of the skills distribution can be interlinked: Cortes and Tessada (2011) find that low-skilled immigrants increase the labour supply of highly educated women by doing housework or caring for children of the latter. The complementarity of immigrants and the native born can also be detected in task specialization. Peri and Sparber (2009) find that foreign-born workers in the US often specialize in occupations that are intensive in manual-physical skills, while natives pursue jobs more intensive in communication-language tasks. Generally, the extent to which migrants can fill labour market shortages or whether migration, through its impact on demand, leads to labour shortages in other areas, is a complex issue (see Ruhs and Anderson 2010 for an extensive discussion).

Discrimination in the labour market
There is substantial evidence that some migrants face discrimination in the labour market, with the likelihood of discrimination increasing, the greater the cultural distance between the migrants and the host community (for a review, see e.g. Darity and Mason, 1998). Traditionally, such discrimination was detected by the observation of earnings differentials that could not be explained by known human capital characteristics. However, in recent years survey evidence has emerged of self-reported discrimination by migrants (e.g. in New Zealand: Daldy et al., 2011) and of attitudes towards migrants by the host population (Mayda, 2006). Following the classic distinction introduced by Becker (1957), discrimination may be due to a dislike of minority workers by employers, fellow workers or customers. In the absence of prejudice there can also be statistical discrimination due to 'stereotyping' of individuals based on negative perceptions of the group they belong to. These perceptions tend to be based on summary statistics, or media reports, on such groups. The impact of discrimination varies

across types, but leads generally to distorted resource allocation and lower incomes. Recent research suggests that migrants wishing to maintain a strong identity may face worse labour market outcomes (Bisin et al. 2011). Conversely, ethnic identity is endogenous and greater marginalisation may actually lead to the marginalised group having a stronger ethnic identity.

Migrants' post-settlement human capital investments
There is a huge amount of literature that shows that immigrants upon arrival in the host country earn less than comparable native born, but that the earnings gap usually decreases over time (see e.g. OECD 2007, 2008 for case studies in a range of countries). This decrease is partially due to migrants becoming more familiar with the host country labour market and gaining more experience, but it can also be due to additional education (particularly improving language skills) and formal on the job training. Some governments provide training subsidies to improve economic integration of migrants. Post-settlement education can have a higher return for migrants than for comparable native born (see Phillips et al. 2011 for New Zealand evidence). However, there has been little systematic research on the incidence of post-settlement education and training, and the impact of migrant training on the native born. Baker and Wooden (1992) find that in Australia there is no crowding out of native-born low skilled workers by low skilled immigrants in publicly provided training programmes.

Social security
The impact of migration on social security is of course one specific, but important, aspect of the fiscal impact analysis which was already reviewed in the previous section. The impact of new immigrant arrivals on social security depends on the host country's rules regarding the eligibility for welfare payment and the residency status of the migrants. In many countries, migrants are not eligible for social security until one or two years after arrival in the host country. Consequently, during the initial period of job search they must rely on their own funds or on support from within their own network. Nonetheless, there is a perception in many host countries that an increased flow of migrants, particularly unskilled, erodes the sustainability of the social security system. Alesina and Glaeser (2004) argue that increased immigration will weaken solidarity among the host population with respect to social welfare provisions. Using attitudinal data from the European Social Survey, Mau and Burkhardt (2009) find indeed that greater diversity is negatively correlated with welfare state solidarity, although the association is weak and context-specific (depending on country and individual characteristics). Moreover, the actual social security impact is likely to be less than the perception. For example, Dustmann et al. (2009) find that Eastern European migrants to the UK are, once eligible, less likely to receive social security benefits than comparable UK born and less likely to live in social housing.

Housing
In the short-run, housing supply at any particular location is fixed. Consequently, unless there is underutilization of the existing stock (which occurs when there are vacant rental houses and an excess supply of houses for sale), an increase in housing demand is going to increase rents

and house prices. This is precisely what empirical research suggests. Saiz (2007) finds by means of US data that an immigration inflow equal to 1 percent of a city's population is associated with average rent and house values increasing by 1 percent as well. Since MIA of labour market impacts suggests wage changes that are on average much smaller, an immigration inflow will positively impact on real wealth of real estate owners but may reduce housing affordability among renters and those wishing to purchase a first home. However, Ottaviano and Peri (2007) argue that this diminished housing affordability only applies to local residents who compete in the same labour market the immigrants are in. The people most affected are often earlier migrants from the same origin. For many other local people wages may increase at the same rate as prices, leaving housing affordability unaffected. Using the natural experiment of the Mariel boatlift, Saiz (2003) shows that there can be housing market segmentation: the housing market where migrants search for accommodation (in Miami, the low-income rental units) is affected but higher quality housing is not.

Effects on levels and prices of food, transportation, etc.
An important, but often overlooked aspect of immigration is the impact on local demand (Bodvarsson and Van den Berg, 2009). To assess the short-run impact of immigration on relative prices, a distinction must be made between goods and services traded between markets and non-traded goods and services. For the former, the supply elasticity is likely to be high and there is likely to be little impact on prices. However, for non-traded goods and services (local plumbers, restaurants, taxis, etc.) prices may be expected to increase unless migrants themselves provide the additional labour for those types of activities. If they do, that would keep wages and prices down. The empirical evidence suggests that migrants do often provide local services and that this offsets the increased demand effect. Cortes (2008) finds that a 10 percent increase in the share of low-skilled immigrants in the US decreases the price of immigrant-intensive services (such as housekeeping and gardening) by 2 percent. Lach (2007) finds that the large influx of former Soviet Union migrants to Israel in 1990 significantly reduced prices there: a 1 percentage point increase in the ratio of immigrants to natives decreased prices by 0.5 percentage points on average. In conclusion, the local price effect is likely to be downward unless the local market faces significant supply constraints.

Saving behaviour
The classic lifecycle hypothesis of saving behaviour suggests that saving is closely related to age (Modigliani, 1970). During mid-life individuals earn more than they consume. The resulting savings are used within the household to fund the consumption of children, or these savings are redistributed by government and private pension funds for the consumption of the elderly. Since migrants tend to be young and have high labour force participation, they increase savings available in the economy. Some of these are repatriated in the form of remittances. Bauer and Sinning (2011) find, using German data, that when remittances are treated as savings, migrants who intend to return to their home country save significantly more than comparable natives. Similar evidence is found by Islam et al. (2010) on the basis of econometric modelling of data on Australian households.

4   Short-run Macroeconomic Impacts

Population size, composition and geographic distribution
National population growth is the sum of natural increase and net international migration. In the short-run, the magnitude of natural increase is rather constant but immigration and emigration levels can fluctuate widely. Moreover, natural increase is becoming small in many developed countries that have below replacement fertility rates. Consequently, the rate of population growth is strongly affected in the short run by international migration. Moreover, migration is also highly age selective. Most migrants are young adults or parents with young children. Coleman (2008) notes that international migration is now the dominant factor determining the size, rate of change and composition of the population of most European countries. This is the case in other parts of the world as well. International migration also strongly influences the spatial distribution of population, given that most immigrants settle in large, internationally interconnected, metropolitan areas (Gorter et al., 1998). Although data quality and completeness remain important issues, the demographic impact of immigration can be assessed more effectively in recent years by much improved and detailed information provided by the World Bank, UN and OECD.

Capacity utilisation, the business cycle and expectations
At the macro level, immigration contributes to both aggregate demand and supply. An exogenous positive immigration shock increases domestic consumption and may drive up profit expectations of businesses, resulting over time in higher investment in plant, equipment and buildings. From a Keynesian perspective, the increase in demand will have multiplier effects. Mishan and Needleman (1966) and other early MIAs (see e.g. Poot et al. 1988) conclude that the increase in demand is in the short-run stronger than the supply effects associated with immigrant employment. This then leads to excess aggregate demand. This, plus the fact that immigration is itself endogenous and positive correlated with aggregate demand, implies that immigration can increase the amplitude of the business cycle. This issue has been extensively revisited in recent years in the context of the global financial crisis and its aftermath. Peri (2010) concludes, based on US data, that in times of a recession there may be a net aggregate supply effect, leading to immigrants having a small negative impact on native employment in the short-run. Such findings may be context specific and, for example, depend on the extent of return migration or the skill levels of the migrants. Using German and UK data, Dustmann et al. (2010) find that immigrants are more exposed to business cycle shocks than comparable native born workers.

National and sectoral accounts
The impact of immigration on macroeconomic aggregates such as Gross Domestic Product and on the sectoral distribution of output will depend on the scale and composition of the migration flow. Barrell et al. (2010) specifically consider the macroeconomic impacts of EU enlargement on both migrant sending countries and host countries. They find that such impacts depend on the human capital of the migrants, the structure of the sending and receiving economies, and

whether the migration is temporary or permanent. The impacts can be calculated with structural macroeconometric models, time-series models or CGE models that have a short-run closure (i.e. which usually assumes that the capital stock in each sector is fixed in the short-run). Even in the short-run immigration generates a small gain in income per capita to the native born (which is likely to predominantly accrue to the owners of capital). This is referred to as the 'immigration surplus', as calculated for the US by Borjas (1999). However, with a fixed capital stock, overall GDP per capita may decline in the short-run. National accounts sectors that are likely to be most affected are those directly associated with the additional population growth: housing, food, clothing and transportation.

Health and education expenditure, fiscal balance
Fiscal impact analysis was already discussed in the previous section. The short-run impact of additional population due to migration can be assessed in a relatively straightforward manner by applying estimates of age, gender and region-specific per capita public expenditures. Contributions to direct taxes can be calculated from administrative tax data. Indirect tax contributions can be estimated from household expenditure data. Such calculations have been carried out in many host countries. Rowthorn (2008) provides an extensive review. He concludes that the impact is closely linked to the skill level of the migrants, with the least skilled having a negative fiscal impact. A typical example is Dustmann et al. (2009), who compare in the UK the net fiscal contribution of migrants from A8 countries (Central and Eastern European countries that joined the EU in Many 2004) to that of the UK born. They find that A8 immigrants have a net positive impact due to higher labour force participation, relatively larger contributions to indirect taxes and much lower use of benefits and public services. Slack et al. (2007) find with similar New Zealand calculations that the positive net fiscal impact increases with duration of residence and skill level of the migrants.

International trade and balance of payments
As noted earlier, immigration-induced population growth increases aggregate demand and output. In turn, this increases the demand for imports. Exports may increase as well, particularly if the presence of immigrants in export industries lowers unit production costs. Immigrants may be expected to have on-going links with the home country that can help businesses in the host country to develop networks that can facilitate exporting to, or importing from, the migrant home country. Immigrants also have a good understanding of the institutional and legal arrangements in their home country and where their native language is different from that of the host country they can improve communication and trust in trading relationships. At the same time, migrants often have a preference for certain goods from the home country (particularly, but not exclusively, food items). In time, the 'demonstration effect' increases demand for such ethnic products among the host population as well.

Starting with Gould (1994), a number of econometric studies conducted since the 1990s suggest that immigration has a statistically significant impact on merchandise trade. Because most studies have adopted broadly the same model specification, namely a log-linear gravity model of export and import flows augmented with the logarithm of the stock of immigrants

from specific source countries as an additional explanatory variable, the resulting elasticities are broadly comparable and suitable for meta-analysis. Genc et al. (2012) conduct in Chapter 9 of this book a meta-analysis of import and export elasticities of immigration across 48 studies that yielded some 300 estimates. They find that an increase in the number of immigrants by 10 percent increases the volume of trade by about 1.5 percent. One might expect the effect on imports to be stronger than the exports effect in the short run, although the meta-analysis shows this to be the case in only half of the countries considered. If the short-run impact on the current account is negative, this is likely to be offset by capital inflows resulting from higher interest rates (see below). Immigration has also been shown to positively impact on tourism (e.g. Law et al. 2009) and on Foreign Direct Investment (e.g. Javorcik et al. 2010).

Unemployment
At the macro-level, countries are likely to observe an inverse correlation between immigration and the unemployment rate. The reasons are the aggregate demand effect of an immigration shock, the complementarity of migrants and locals in production, and the endogeneity of immigration itself. Net immigration is likely to be lower when host countries have a high unemployment rate (e.g., Jennissen, 2003). It should be noted that it is not inconsistent for an increase in immigration to coincide with an increase in the number of unemployed (simply due to the host labour market having become larger), while at the same time coinciding with a lower unemployment rate. The higher level of unemployment may not cause concern if it is search-related short-term unemployment and if immigrants only become eligible for welfare after twelve months residence or longer. An inverse correlation between the net immigration rate and the unemployment rate does not imply that immigration causes a lower unemployment rate. Granger causality tests in VAR models have been used to assess the impact of a migration shock on the unemployment rate. Boubtane et al. (2011) review earlier evidence and conduct their own Granger causality tests with annual data over the period 1980-2005 for 22 OECD countries. They find that, except for Portugal, immigrants are not deterred by unemployment rates while in no country immigration causes a change in the unemployment rate.

Wage and price inflation
The microeconometric evidence already reviewed earlier suggests that the impact of immigration on wages is negligible or slightly negative. Consequently, one would not expect an immigration shock to contribute to wage inflation. Similarly, the evidence on price changes also suggests that, unless the economy faces severe supply constraints in the presence of immigration-induced demand increases, immigration is unlikely to lead to inflationary pressures (the housing market may be one exception). Junankar and Pope (1990) use VAR models to test the impact of immigration on inflation. They do not find any statistically significant relationship between immigration and inflation in Australia. More recently, Blanchflower et al. (2007) find that A8 immigration to the UK reduced inflationary pressures there. This finding is also consistent with the modelling of the enlargement of the EU by Barrell et al. (2010) and with the finding by Bentolila et al. (2008) that immigration flattened

the Phillips curve in Spain because unemployment dropped during the period 1995-2006 without increasing inflation.

Interest rates
The impact of immigration on monetary conditions such as money supply and interest rates has not yet been investigated explicitly. Using conventional macroeconomic theories one would expect that an immigration shock, which increases aggregate demand and the scale of the host economy, puts upward pressure on interest rates. However, the empirical evidence suggests that there is little effect on inflationary pressures, except for real estate markets. Consequently, nominal interest rates may not change much either. Moreover, the increasing demand for investment will attract foreign capital since the immigration shock lowers the capital-labour ratio and therefore raises the rate of return to capital. This process will continue until the risk-adjusted real rates of return to capital are equalised across countries in the long run. These processes suggest that in the short-run an immigration shock may have a small upward effect on interest rates, but that there is no impact in the long-run. Empirical estimates of the impact of immigration on interest rates can be found in studies that use large-scale macroeconometric models of national economies. Certainly, independent central banks, such as the Reserve Bank of New Zealand, take the results of such models and expected migration trends into account in setting interest rates. The main channel of concern is the impact of immigration-induced house price increases on inflation (e.g., Coleman and Landon-Lane, 2007).

Income distribution
Reviews such as Katz and Autor (1999) identify immigration as one of the supply-side causes of growing earnings inequality in the developed world. Card (2009) concludes that immigration has had very small impacts on wage inequality among natives, but when the immigrants themselves are counted in the overall population, they do increase income inequality. Similarly, Deding et al. (2010) find that the contribution of immigrants to overall inequality in Denmark and Germany increased between 1984 and 2003. However, such evidence may be particularly expected in countries which have in recent decades seen rapid growth in unskilled immigration. The question remains whether growing immigration of skilled workers also increases individual earnings inequality. Simulations of the Irish labour market between 1994 and 1997 by Barrett et al. (2002) show that an increase in skilled labour there through immigration reduces earnings inequality.

Utilisation and congestion of public infrastructure
By definition, public infrastructure should be considered fixed in the short-run. The impact of immigration on infrastructure therefore depends on the extent to which there exists excess capacity in infrastructure utilisation before the immigration shock, and the size of the immigrant inflow. Given the spatial selectivity of migration, with immigrants settling predominantly in metropolitan areas, any impact on infrastructure utilisation is likely to be highly localised. There is virtually no empirical literature on this topic yet. Breunig and

Rocaboy (2007) find by means of French data a U-shaped relationship between population and per capita expenditure on congestible public goods.

5   Long-run Microeconomic Impacts

Labour market flexibility
Migrants have several attributes that can contribute to enhanced labour market flexibility. Firstly, they tend to be relatively young, and younger workers have higher geographical, occupational and industrial labour mobility. Hence markets with a large number of migrants are likely to adjust faster to demand shocks. Moreover, migrants are less likely to belong to trade unions (e.g. Fitzgerald and Hardy, 2009). Finally, migrants are positively self-selected. Workers who are willing to face the challenges of moving to a foreign and culturally different environment are likely to be adaptable to changing circumstances. It is therefore not surprising that Borjas (2001) concludes that immigrants 'grease the wheels of the labour market', i.e. enhance labour market efficiency. Conversely, immigrant integration in the host country's labour market is faster when this labour market is more flexible (Miller and Neo, 2003).

Business practices, innovation and entrepreneurship
Immigration policies of host countries are increasingly encouraging the migration of professional workers, particularly those referred to as 'talent' or the 'creative class' (Florida, 2002). Special visas are also sometimes offered to immigrants bringing in capital and willing to invest this in businesses in the host country, particularly when this investment is active (i.e. with the migrant taking on a managerial role) rather than passive (purchase of real estate, shares, etc.). Migrants have also often high rates of self-employment, with ethnic networks playing an important role in generating clientele (Toussaint-Comeau, 2011). In any case, workers with different cultural backgrounds can represent complementary skills, problem-solving abilities, ideas and aspirations. Migrants can therefore make a major contribution to vitality and entrepreneurship in the city, not only through their own entrepreneurial activities (see the review by OECD 2010) but also through spillovers to the host country entrepreneurs (Jaeger and Duleep, 2010).

        The presence and diversity of migrants in firms can have a positive impact on innovation activities by these firms. Ozgen et al. (2011) find that firms in which foreigners account for a relatively large share of employment are generally less innovative, but there is strong evidence that firms that employ a more diverse foreign workforce are more innovative, particularly in terms of product innovations. These findings are based on a linked Dutch employer-employee micro-dataset of 4582 firms, derived from survey and administrative data obtained from Statistics Netherlands. Lee and Nathan (2010) find similarly by means of the 2007 London Annual Business Survey (2300 firms) a significant positive relationship between workforce and ownership diversity, and product and process innovations.

Migrant adaptation and 'catch up'

A robust finding in the literature is that, upon arrival in the host country, most migrants initially earn less than comparable native-born workers, and have a greater likelihood of experiencing a spell of unemployment (e.g. Borjas, 1999). However, some professional migrant workers, whose salaries are determined in global markets, may earn in some countries upon arrival straightaway more than comparable native born workers. Nonetheless, in most cases there will be an earnings gap with migrants earning less and this gap declines with increasing years in the host country. An important issue is the rate of convergence of immigrant earnings to native earnings and the extent to which a 'catch up' is likely, or a differential remains in the long-run. As outlined in Section 1.2(c) above, the impact of years since migration on earnings is estimated by means of a suitably enhanced earnings function, i.e. regression equations that explain the earnings of an individual in terms of human capital and other characteristics. It is well known that estimates of migrant earnings convergence to that of locals can be biased when these are based on cross-sectional data and there is heterogeneity between successive cohorts of arrivals (e.g. Borjas, 1999). For example, the empirical evidence for the US suggests that immigrants arriving after 1965 started there on average with a larger wage disadvantage and had a smaller rate of relative wage growth. Nonetheless, the broad conclusion from the empirical literature is that earnings of immigrants indeed increase faster after settlement than those of comparable native born workers, even when considering migrants longitudinally rather than cross-sectionally.

The number of years it takes to reach equality of earning between migrants and comparable (in terms of human capital characteristics) locally born workers varies across countries and migrant groups. Generally, the process is a slow one that extends over a number of years and in some cases migrant earnings may remain lower than those of comparable native born until retirement. New Zealand evidence, reviewed by Hodgson and Poot (2010), suggests that it takes about 10-15 years on average for migrant workers to catch up to their native born peers.

Migrant geographical and social clustering
The geographic location patterns of immigrants are usually different to those of the host society. Immigrants are often found in metropolitan areas and, moreover, also often concentrated in specific parts of such cities, often referred to as ethnic precincts or ethnic enclaves (Edin et al., 2003). This has led to a lot of interest in researching the causes, patterns and consequences of immigrant residential 'sorting'. The changes in immigrant sorting patterns over time inform on the degree of integration into a host society, the adaptation of skills, language and also labour market outcomes.

An interesting issue is the extent to which the path of migrant wages over time depends on migrants living in ethnic enclaves or not. The spatial concentration of migrants could lead to higher chances of employment (e.g. by immigrants employers) but lower wages (in segmented labour markets). Migrant clusters may also make migrants less inclined to invest in host country specific skills, such as language (e.g. Lazear, 1999).

In many developed countries, there has been an increasing spatial segregation of the population generally (e.g. by income) and of the migrant population in particular (see e.g.

Cutler et al. 2008a for US evidence). A problem in measuring the impact of migrant clusters is that migrants endogenously select their location. Cutler et al. (2008b) find with US data on first generation immigrants that selection into enclave neighbourhoods is on balance negative. However, once they correct for this selection, they find positive mean effects of segregation. Particularly when the group is better educated on average, the impact of segregation is more positive.

Social mobility across generations
Due to acculturation, immigrant groups may be expected to become more integrated not only in terms of their residential locations (Grbic et al., 2010), but also in terms of their education and labour market outcomes. Algan et al. (2010) focus on second-generation immigrants in France, Germany and the UK. Many immigrants in Europe are low skilled but Algan et al. find that the second-generation immigrants have education levels closer to those of the host population than the first generation. The impact on labour market outcomes tends to be country-specific: in the UK the second generation does much better than the first generation, but evidence of progress in France and Germany is not so clear-cut.

Aydemir et al. (2009) examine intergenerational earnings mobility of immigrants by means of the Canadian 2001 Census. They conclude that the degree of intergenerational persistence is about the same for immigrants as for the entire population. However, there appears to be more generational mobility among immigrants in Canada than in the United States.

Rusinovic (2006) shows by means of a survey of immigrant entrepreneurs in the Netherlands, that a larger percentage of the first generation is active in an ethnic market (31 percent) than the second generation (15 percent). According to Rusinovic, for the second generation transnational involvement has become more a strategic choice – 'strategic transnationalism' − whereas for the first generation it is more often a necessity.

Finally, Messinis (2009) compares first and second generation migrant outcomes with those of the remainder of the Australian population, using waves 1-7 of the longitudinal HILDA survey (about 12,000 individuals annually). He finds that most second-generation Australians from a non-English speaking background do not experience the disadvantage associated with the first generation of this background. Intriguingly, the second-generation men of English-speaking background consistently earn less than the average worker.

Migrants' net fiscal balance over the lifecycle
When discussing the short-run fiscal impacts it was noted that – particularly due migrants making the age distribution of the population more youthful and their limited eligibility for social security benefits in early years after arrival – the net fiscal impact tends to be positive in the aggregate. However, it was already stressed in the previous section that it is important to also take a life course perspective rather than just a single year or 'snapshot' perspective. Rowthorn (2008) reviews the evidence. Since the public sector effectively redistributes resources from those on high incomes to those on low or no income, the net fiscal balance over the life cycle would be positive for highly skilled migrants (taking also into account that their

education was often subsidised by the home country government) but negative for the least skilled. Temporary migrants would yield a more positive net fiscal impact than permanent migrants because post-retirement health expenditure of the former would not be incurred by the host country.

Remittances
Many migrants send money to relatives in the home country. Remittances are therefore a major source of income in many developing countries. There are various motives for remittances (e.g., OECD 2006). One motive is that of pure altruism: the migrant derives satisfaction from improved welfare of his/her relatives. A second reason for remitting is that of pure self-interest. Through remitting, migrants 'buy' favours from relatives back home, such as the maintenance of assets or favourable consideration in inheritance. A third reason for remitting is simply that of consumption smoothing over the life course. Migrants who have an intention of returning home may remit funds in order to save income that can fund consumption upon return. The actual motives for remittances may be somewhere between the extremes of pure altruism and pure self-interest. The determinants of remittances are reviewed by Carling (2008).

Evidence reported in OECD (2006) suggests that temporary migrants remit more than those who see their migration as permanent. The longer migrants remain abroad, the smaller the proportion of income that they are likely to remit. In contrast, remittances may increase at a time when the probability of returning home increases.

Page and Plaza (2006) provide a review of global evidence regarding the contribution of remittances to economic development in migrant sending countries. Giuliano and Ruiz-Arranz (2009) argue that remittances can be particularly beneficial for growth in countries where the financial system is less developed.

The stock and composition of human capital: brain drain or gain
As noted in the introduction to this chapter, the classic perspective of migration is that the positive self-selection of emigrants in terms of skills and unmeasured ability generates a brain drain (e.g., Bhagwati, 1976). More recently, the impact of such selection effects are seen in a more positive light, particularly from a long-term perspective (e.g., Mayr and Peri, 2008; Duncan, 2008). It is argued that the higher returns obtainable abroad to investments in education and training encourage a greater proportion of the work force to invest in human capital than otherwise, thereby generating a positive spillover in the source country. Furthermore, the incidence of return migration and circulation is increasing (see e.g. Dustmann and Weiss, 2007, for theory and UK evidence on temporary migration).

Up to about one third of migrants may return to the home country in the long run. The return of diaspora raises human capital levels and entrepreneurship in the source country, but their engagement with the home country through established networks can benefit both the host and home countries. Gibson and McKenzie (2011) use a unique survey of the best students from three Pacific countries to assess the extent of emigration and return migration among the very highly skilled. They find that among this group the potential income gain (which is substantial) is not the main determinant of emigration. Similarly, the decision to return is

strongly linked to family and lifestyle reasons, rather than to the income opportunities in different countries.

International merchandise and services trade, tourism and travel patterns
Genc et al. (2012) show in chapter 9 of this book that immigration generates additional imports and exports. However, most studies do not explicitly consider the dynamics of these impacts and, instead, link the current stock of migrants to the current trade flows. Given that immigration contributes to demand in the host economy from the day of arrival, it is plausible that the impact on imports is initially larger than on exports, but with latter growing faster. The ultimate impact will depend on the immigration and trade policies of countries. The meta-analysis by Genc et al. (2012) shows that the impact on imports exceeds than on exports in half the countries considered. Poot and Strutt (2010) show that governments may take barriers to migration into account in bilateral negotiations regarding trade liberalisation.

Migration, international trade and tourism are closely interrelated phenomena. It is likely that there is a clear positive correlation between migration and tourism, in particular VFR (visits to friends and relatives). The sparsely available information suggests a positive contribution of migration to a country's tourism sector, and hence to a rise in GDP. However, Law et al. (2009) find that in the New Zealand case, the impact on outbound tourism (New Zealanders visiting expats and diaspora abroad, or immigrants going home) exceeds that on inbound tourism (by the native born of the countries where New Zealand migrants reside, and by visitors from the immigrants' home countries).

McCann et al. (2010) show how international migration is related to the frequency and duration of VFR in the home country. For many migrants, international migration triggers a series of trips to visit the home country that allow for a replenishment of the depleted relationship capital with family and friends back home, but these trips incur travel costs and foregone earnings. Their model shows that the optimized travel frequency is inversely related to the distance and the transportation costs, and positively related to the psychological costs of separation. This has been confirmed with longitudinal data on New Zealand and UK migrants in Australia.

International information and knowledge transfers and networks
Beine et al. (2011) show how existing diasporas (the stock of people born in a country and living in another one) affect the size and human-capital structure of bilateral migration flows. They find that diasporas increase migration flows but lower the average educational level of migrants. However, diasporas also generate network and information flows that benefit international trade in goods and services, tourism and FDI. Diasporas are becoming more important for business networks because of the growth in international migration (40 percent since 1990) and declining cost of travel and communication, combined with new communication technologies. Diasporas have three benefits for international business. They facilitate the exchange of complex information, they foster trust in trading relations, and they assist in expanding and strengthening international networks. Docquier and Lodigiani (2010)

examine the role of migrants' networks in promoting cross border investments and find evidence of strong network externalities in FDI, mainly associated with the skilled diaspora.

6   Long-run Macroeconomic Impacts

Fertility and population ageing
In many countries, particularly in Europe but also in Asia, the total fertility rate (the number of children a woman would have if she experienced the current age-specific fertility profile throughout her childbearing years) is below the replacement level of 2.1. Additionally, life expectancy continues to increase. Consequently, populations are ageing both numerically (an increase in the population aged 65 and over) and structurally (an increase in the share of the population aged 65 and over). Population ageing is a global phenomenon, with the demographic dependency ratio (the proportion of the population aged less than 15 and those aged 65 and over divided by those aged 15-64) increasing everywhere except in Africa (UNDESA, 2010). The momentum of high fertility in developing countries in the past implies a huge structural imbalance in the world, with large and growing numbers of young adults in developing countries and shrinking numbers of young adults in developed countries. For example, based on current projections, the population of Europe is expected to be less in 2050 than now while the population of Africa will grow from being 40 percent greater than that of Europe to being four times the population of Europe. These trends suggest that the pressure for migration to act as an equilibrating mechanism is growing. However, migration cannot stop population ageing. The number of immigrants needed to offset the impact of fertility decline on population would be much greater than can be realistically expected (e.g. Coleman, 2008; Poot, 2008). Moreover, while fertility of immigrants may be higher than that of the native born population, the process of acculturation and successful economic integration would contribute to immigrants' fertility converging on the below replacement rates of the native born population.

Real income per head and the long-run rate of economic growth
There are three ways in which immigration can lead to greater growth in income per capita. These are (1) acceleration of convergence to the long-run steady state growth path through enhancing openness of the host economy and increasing the demand for new investment; (2) through promoting innovation and consequential long-run changes in total factor productivity; and (3) through improving allocative efficiency, which again may boost total factor productivity. The second of these will be discussed under the technological change heading. The third was already reviewed under the heading of labour market flexibility.

The first effect of immigration on growth is through equilibrium or 'steady-state' effects in open economy growth models. Barro and Sala-i-Martin (2004) show in a model that allows for perfect capital mobility and imperfect labour mobility in a small open economy that higher immigration speeds up convergence to the long-run steady state growth rate. Migrants are also more likely to cluster in major cities which may increase the growth rate through agglomeration effects.

The impact of immigrants on income per head in the host population depends on the extent to which migrants and locals are substitutes, and the extent to which immigration induces capital accumulation. The literature suggests that the positive impact is larger, the more dissimilar the migrants and the native born (e.g. Borjas, 1999). Using European regional data, Brunow and Brenzel (2011) find that high-skilled foreign workers can be regarded as a positive productive 'amenity' from a regional perspective, in particular if this group is diversified in terms of national backgrounds. The presence of low-skilled foreign workers is, in contrast, related to lower regional productivity. Yet, for a given number of low-skilled foreign workers, their diversity still benefits productivity.

A study by Boeri and Brücker (2005) shows that international migration can significantly increase income per capita in Europe. They have estimated that, given the wage and productivity gap between Western and Eastern Europe, a migration flow of 3 per cent of the Eastern European population to the West could increase total EU GDP by up to 0.5 per cent.

International convergence or divergence
A central question in MIA is the impact of migration on welfare in the sending and receiving countries, usually measured by income growth. On this issue there is meta-analytic evidence. Ozgen et al. (2010) combine 12 papers, dated between 1991 and 2008, from which 67 estimates were obtained. They find that even though in regional systems there is a long-run tendency to convergence, net inward migration actually raises the rate of growth in per capita income. Ozgen et al. (2010) find that an increase of one percentage point in the net migration rate of a region increases the per capita income growth rate in that region on average by about 0.1 percentage points. While this meta-analysis is based on studies of interregional migration rather than international flows, a similar positive relationship may be expected in the latter case.

Sectoral composition of the economy
For considering the implications of varying levels of immigration on the economy, and the sensitivity of such economic outcomes to immigration policy, the CGE model is a natural tool as micro-level factors such as the demographic and skill composition of immigrants can be taken into account. This does not imply that there is no need for analysis at the macro-level: CGE models principally calculate the market-driven allocation of a given total quantity of resources (labour, capital and natural resources) in the economy and they require an input of information (factors exogenous to the model) on certain macro-level variables, such as the total available capital stock and the rate of technological progress (these exogenous factors that are fed into the model are called the 'model closure'). CGE models were already reviewed in Section 1.2. These models tend to operate in two 'modes': a short-run mode in which the amount of capital allocated to each sector is considered fixed and a long-run mode in which capital accumulation is endogenous.

In a review of 2005-2010 research on economic impacts of immigration in New Zealand, Hodgson and Poot (2010) conclude that simulations over a 15-year period with a New Zealand CGE model suggest that even without additional technological change, additional immigration raises gross domestic product (GDP) per capita, albeit only modestly. Conversely, without net

immigration, GDP per capita would be less. The CGE model simulations also suggest that changes in immigration policy and changes in the New Zealand economy over the last quarter century now yield greater economic benefits from immigration than in the past. Baas and Brücker (2010) examine the effects of Eastern enlargement of the EU on Germany and United Kingdom using a CGE model which considers wage rigidities. They find that Eastern enlargement positively impact real GDP, wages and employment in both economies and that the effects are substantially larger than those found in previous studies.

Public and private infrastructure
The long-run impact of immigration on infrastructure has been to date a rather neglected area of research because it is difficult to assess the extent to which immigration generates congestion effects and the extent to which it triggers additional infrastructure. The most comprehensive study was done by Murphy et al. (1990) for Australia. This study did not find that immigration at the levels experienced in Australia led to infrastructure needs that were much greater than would have been the case with lower immigration. In developed countries which have still relatively high levels of natural increase, (such as US, Canada, Australia and New Zealand), the impact of immigration on infrastructure is small at the national level because the contribution of net immigration to overall population growth remains minor. Of course, there may be local impacts in fast growing cities. Moreover, we may expect that in countries with declining or negative natural increase, but spatially concentrated immigration in certain regions, the impact of immigration on on infrastructure (and particularly housing) in such regions will be even larger.

Economies of scale and agglomeration
"New world' immigration countries considered the small scale of urban settlement and low population density generally as factors that impeded economic efficiency and long-run growth. Immigration was seen as a mean of increasing the scale of the domestic market, which enabled domestic firms to operate with lower unit costs. Assumptions about sector-specific economies of scale have been incorporated in CGE model of immigration scenarios (e.g. Poot et al. 1988). However, global economic integration has nowadays weakened the argument of economies of scale being a benefit of immigration. In the traded goods sector, the optimal scale of operation of enterprises is determined by technology and global competition, not by the presence of migrants. Of course, scale can continue to play a role in the provision of local services. Where there are considerable setting-up costs, the contestability of firms in local markets may depend on market size. Population growth through immigration may encourage multiple suppliers and competition.

However, the long-run benefits of immigration are more likely to come from agglomeration rather than scale effects. As has already been noted previously in this chapter, migrants are disproportionally drawn to major agglomerations (due to the availability of jobs, amenities and higher incomes). In the modern globalised and knowledge driven economy, agglomeration advantages are strengthening (e.g. Glaeser, 2011). Not only the level of

immigration, but also the cultural diversity of immigrants is contributing to the increasing benefits of agglomeration.

Technological change and total factor productivity growth
Since immigration increases the rate of return to capital, it is likely to generate additional investment. To the extent that new investment embodies the latest technological developments, immigration contributes through this channel to technological change and total factor productivity growth. However, immigrants also contribute directly to innovation through entrepreneurship, self-employment and the exchange of ideas and practices within firms.

Ozgen et al. (2012) study in Chapter 8 of this book the relation between immigration and innovation measured by patent applications in NUTS 2 level regions across 12 European countries. They find that the impact of increasing population diversity is statistically significant, but quantitatively small relative to all other influences on patent applications. Moreover, patent applications are only positively affected by the diversity of the immigrant community beyond a critical minimum level of diversity. A distinct composition of immigrants from different backgrounds is also a more important driving force for innovation than the sheer size of the immigrant population in a certain locality. The findings also show that an increase in the average skill level of migrants has a positive effect on patent applications. These results are consistent with North American and European studies review in Chapter 8.

Foreign debt per capita
The impact of immigration on foreign debt is the cumulative combined effect of the impacts on merchandise trade, trade in services, and domestic net savings. With respect to trade, Genc et al. (2012) show in chapter 9 that immigration increases both imports and exports. The impact on the trade balance varies between countries, but since the effects on imports and exports are roughly similar, the impact on the trade balance and, consequently, foreign debt is negligible. Moreover, since immigration lowers the demographic dependency ratio, it is expected to increase the aggregate saving rate.

However, the savings of immigrants are partially repatriated through remittances. In aggregate, the 215 million international migrants in the world transferred in 2010 remittances worth $440 US billion to their home countries (World Bank, 2011). The stated amounts are most likely underestimates due to the difficulty in measuring remittances. Adams (2008) models the determinants of remittances and finds that the skill composition of migrants does matter in remittance determination. Countries which export a larger share of high-skilled (educated) migrants receive less per capita remittances than countries which export a larger proportion of low-skilled migrants. Conversely, the impact on foreign debt of host countries would be less for high skilled migrants than for low skilled migrants.

Public debt per capita
When the impact of immigration on public revenue is roughly equal to that on public expenditure, immigration confers a simple externality on the home and host countries in the short run: it lowers public debt per capita in the host country, but increases it in the home

country. In the long-run, the situation is more complicated because of the general equilibrium, congestion and generational effects of immigration. Auerbach and Oreopoulis (1999) find that because new immigrants represent a larger fraction of future generations than of present ones, shifting the burden of net public expenditure onto future generations also shifts it relatively onto immigrants. Thus, immigration can be used in principle as a tool for reducing public debt. However, Auerbach and Oreopoulis (1999) argue that the impact of immigration on fiscal balance is rather small, so that immigration should not be viewed as a major cause of budget deficits or as a solution to these.

Rowthorn (2008) reviews the evidence on the fiscal impact of migration and compares the findings of studies calculating the 'generational accounting' net impact with studies focussing on the short-run impact only. He compares European with US findings and concludes that most of the European studies are more pessimistic about the fiscal impact of low-skilled immigration than are their US equivalents. This may be because the former have a more generous welfare system than the US and hence incur more public expenditure on low-paid immigrants and their dependants. Using a natural experiment due to a state-sponsored placement policy of refugees in Denmark which restricts their choice of residence and requires local governments to accept them as citizens, Gerdes (2011) considers the causal impact of immigration on the local public sector. He finds that the refugee influx did not decline the size of the local public sector.

Social cohesion and social capital
A common concern about immigration is that growing cultural diversity could threaten the host country's culture or social cohesion. Diminished social cohesion could lead to worse economic outcomes (e.g. Killerby and Wallis, 2002)). Little explicit modelling has been done on the economic impact of immigration through its effect on social cohesion (given difficulties in measuring the latter) but some aspect have already been reviewed in this chapter under previous headings, such the impact of the geographical and occupational clustering of immigrants, inequality, intermarriage and ethnic identity, the education of second and higher generations, and language use. Other issues are naturalization, contributions to the arts and sciences, interethnic relations and crime.

Considerable attention has been paid to any possible link between immigration and crime, with empirical studies on the incidence of crime among migrants dating back to the early part of the twentieth century in the United States (see Martinez and Lee, 2000, for a review). Bell et al. (2010) compare crime effects of the large waves of asylum seekers of the late 1990s/early 2000s wave into the UK with the impact of the large inflow of workers from EU accession countries that took place from 2004. They find that due to limited job opportunities of the asylum seekers, there was a small rise in property crime. EU accession country immigration had no such impact. In all respects, there was no difference in observed criminal activities between these migrant groups and the population generally.

Immigrant diversity can have several impacts on social cohesion (see Putnam, 2007). On the one hand, diversity can foster interethnic tolerance and social solidarity. In other words, diversity reduces ethnocentric attitudes and fosters out-group trust (sometimes referred to as

bridging social capital). On the other hand, diversity can also fosters out-group distrust and in-group solidarity (sometimes referred to as bonding social capital). However, Putnam (2007) argues that there are also circumstances in which immigrant diversity can reduce both bonding and bridging social capital. In this case, social diversity could have detrimental effects on social cohesion in Western societies (Alesina and La Ferrara, 2005). The main argument is that in more diverse societies generalized trust is more difficult to foster, resulting in a loss of sense of community and togetherness. In contrast with such negative social impacts of diversity, several of the economic benefits of diversity have already been reviewed earlier in this chapter. Examples are the impacts on firm level productivity, international trade and innovation. In any case, the negative effects of diversity largely depend on individual characteristics such as age, education, and income level. Lower educational attainments, low incomes and unemployment are associated with the perception of negative implications of diversity. However, at the country level, diversity is associated with higher productivity and economic growth and there is no clear evidence that diversity has a negative impact on social cohesion.

The environment
The relationship between migration and the environment is bi-directional: migration impacts on the environment but environmental factors also influence migration. Like the local population, immigrants leave an ecological footprint on the location where they settle. The extent of their environmental impact will depend on their income, commuting patterns, etc. By being predominantly attracted to urban agglomerations, immigrants contribute to the greater environmental challenges faced by these cities, compared with less densely populated areas. The marginal impact is substantially the same as the impact of urbanisation of the host population, unless the socio-economic profiles of the immigrants are quite different from those of internal migrants. Muradian (2006) argues therefore that the expected environmental impact should not be used as a Malthusian argument for limiting immigration flows. Of course, very high levels of inward migration over short periods of time could lead to greater resource scarcity and environmental externalities in the form of additional pollution and congestion. Nonetheless, the cases of relatively sudden and large influxes discussed earlier in the chapter (such as the Mariel Boatlift to Miami) demonstrated a relatively benign socio-economic impact. Local adjustment mechanisms (through collective and individual action) may be expected to generate a similarly modest environmental impact.

In recent years, there is increasing interest in assessing the likelihood of additional cross-border and internal migration due to global climate change (see e.g. Hugo, 2011 for a review). Extreme weather events such as floods, droughts and hurricanes may cause an exodus of people from the affected areas. Moreover, an increase in the sea level may threaten low lying atolls. Hugo (2011) argues that so-called 'hot spot' of likely environmental disasters tend to be in developing countries with high population growth and density. Consequently, global climate change may trigger migration as a climate change adaptation policy. While the number of 'climate refugees' will be growing, Barnett and Webber (2010) argue that most of the resulting migration will be internal rather than international.

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Table 1 Socio-economic Impacts of International Migration

	SHORT-RUN National / regional/ local	LONG-RUN National / regional / local
MICRO	**Wages and employment (S,R)** **Relative wages between and within migrant and native groups (R)** **Job search and unemployment (R)** **Shortages in specific labour markets (R)** **Discrimination (R)** **Migrants' post-settlement human capital investments (S,R)** **Social security (R)** **Housing (R)** **Effects on levels and prices of other consumption: food, transportation, etc. (R)** **Saving behaviour (S,R)**	**Labour market flexibility (R)** **Business practices, innovation and entrepreneurship (S,R)** **Migrant adaptation and 'catch up' (R)** **Migrant geographical and social clustering (R)** **Social mobility across generations (S,R)** **Migrants' net fiscal balance over the lifecycle (R)** **Remittances (S,R)** **The stock and composition of human capital: brain drain or gain (S,R)** **International trade, tourism and travel patterns (S,R)** **International information and knowledge transfers and networks (S,R)**
MESO/ MACRO	**Population size, composition and geographic distribution (S,R)** **Capacity utilisation, the business cycle and expectations (S,R)** **National and sectoral accounts (S,R)** **Health and education expenditure, fiscal balance (R)** **International trade and balance of payments (S,R)** **Unemployment (S,R)** **Wage and price inflation (S,R)** **Interest rates (R)** **Income distribution (S,R)** **Utilisation and congestion of public infrastructure (R)**	**Fertility and population ageing (R)** **Real income per head and long-run economic growth (S,R)** **International convergence or divergence (S,R)** **Sectoral composition of the economy (S,R)** **Public and private infrastructure (R)** **Economies of scale and agglomeration (R)** **Technological change and total factor productivity (S,R)** **Foreign debt per capita (S,R)** **Public debt per capita (S,R)** **Social cohesion and social capital (R)** **The environment (R)**

Note: 'R': issue is particularly prominent from the perspective of the host country; 'S': issue is particularly prominent from the perspective of the migrant-sending country

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