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**Measuring the Economic Impact of
Immigration: A Scoping Paper**

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Measuring the Economic Impact of Immigration: A Scoping Paper*

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February 2005

Abstract

This discussion paper has three objectives. Firstly, it provides a brief review of recent international empirical research on the labour market impact of immigration. The synthesis of this literature is facilitated by reference to the results from a recent meta-analysis of the impact of immigration on wages. Secondly, the paper briefly reviews international research on other dimensions of the economic impact of immigration, namely productivity and technical change, trade and international relations, the fiscal impact, socio-economic impacts and externalities, and economy-wide (general equilibrium) effects. The approach adopted in considering each of these impacts is to identify the main issues associated with the particular impact, followed by key international references and, where available, New Zealand references on the particular type of impact. The gaps in NZ research are then identified along with any difficulties with the data available for replicating the international studies in New Zealand. Thirdly, the paper seeks to identify feasible (in terms of data availability) suggestions for further research that would add to our knowledge of the economic impact of immigration in New Zealand.

Keywords: Immigration; Economic impact; Meta-analysis, Research scoping

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Executive Summary

Immigration is a complex phenomenon that affects New Zealand in many different ways. This report is concerned with measurement of economic aspects of the impact of immigration. Qualitative research and broader consequences fall outside the scope of the report.

Quantitative research on the economics of migration was already carried out in New Zealand during the 1970s and 1980s, at a time when the topic received relatively little attention in the rest of the world except for in the other 'New World' countries.

Since then, immigration has become closely linked to global economic integration and demographic change, and affects many countries. A burgeoning literature on the economic impact has emerged.

The last literature review of the economic impact of immigration in New Zealand was conducted in 1994. The present report summarises key contributions to the international and New Zealand literature since then and identifies major gaps in our understanding of the economic impact of immigration on New Zealand.

While much can be learnt from the international literature, there are many rather unique features of Aotearoa New Zealand (history, the changing birthplaces of migrants, the migration of New Zealanders themselves, the volatility in the flows, the relationship with Australia, etc.) that suggest that many research findings from abroad may not be readily transferable.

The 1994 reviews concluded that the major constraint on New Zealand-based research was an absence of suitable data. The data situation has much improved since then with new surveys (such as the Income Supplement of the Household Labour Force Survey and the Longitudinal Immigration Survey), access to unit records through Customised Unit Record Files and the Statistics New Zealand data laboratory, and new techniques and software to analyse the data.

Immigrants affect both the demand for goods and services and the supply side of the economy in a number of different ways. The best way to combine all these influences is through a large scale model of the economy that can predict economic outcomes at both micro and macro levels.

It is therefore recommended that further research adopts a multi-stage approach that combines new knowledge on each of the economic aspects of immigration into subsequent simulations that permit an assessment of the implications of various migration scenarios.

Such scenarios should take into account that the composition of migrant flows have changed radically in terms of skilled/business migration, family-sponsored migration, refugee migration, student flows and temporary permit holders.

The research on each of the economic aspects of immigration, such as the impact on the labour market, international trade, innovation, and consumption patterns will be valuable in their own right and are best carried out by experts in each of these areas.

Besides being informative for policy, there are opportunities for New Zealand immigration research to be innovative by international standards. High quality research on this topic is likely to attract considerable interest abroad.

In terms labour market research, New Zealand research on initial experiences and adaptation of immigrants is relatively well developed. The impact of changing policies can be assessed by updating earlier econometric research. However, research on the impact of immigration on wages of locally-born workers is virtually absent and needs to be developed, using recent modelling techniques used abroad.

A meta-analysis of 18 papers from the international literature suggests that the effect of immigration on local wages is very small. An increase in the proportion of migrants in the workforce by 1 percentage point may reduce wages by no more than 0.1 percent. However, the effect on workers who are close substitutes for immigrants may be larger. Differences between studies are due to institutional factors, the geographic scale of measurement of the impact, variation in composition of the flows across countries and ways in which the studies have been conducted.

Research on labour market outcomes should include consequences for labour force participation and unemployment rates, and labour turnover (e.g. quits and hires). It should rely on data from both workers and firms, ideally linked.

Little is known about the impact of immigration on technological change and productivity. Yet this is a central issue for economy-wide modelling of the impact of immigration. Research needs to be conducted both at the macro-level on changes in Total Factor Productivity resulting from immigration and at the micro-level (on innovation, entrepreneurship and agglomeration benefits from migrant clustering).

Immigration leads to an increase in international trade. However, the effect on imports (e.g., through migrant preferences for products from home countries) is stronger in the short run than the effect on exports (through migrants assisting in opening new markets and reducing transaction costs). Further research on

both channels is needed. In the long-run, efficiency gains through immigration may lead to an improved balance of payments.

The effect of immigration on government consumption, tax revenue and social security payments has been extensively researched, both in New Zealand and abroad. However, New Zealand research in this respect lags behind through having taken a short-run snapshot approach rather than a lifecycle approach. The marginal impact of a migrant on fiscal balance over his or her lifecycle should now be calculated.

Immigration may affect social cohesion and, in turn, social cohesion impacts on the level and distribution of wellbeing in society. Thus, comprehensive overviews of the economic impact should include a discussion of issues such as the impact of geographical and occupational clustering of immigrants, inequality, social mobility across generations, cultural diversity and cross-cultural relations, crime, etc. Recent New Zealand research on attitudes toward immigrants is informative. The implications of such attitudes (including discrimination, where present) for labour market outcomes are still to be assessed.

Housing is an area of major importance in terms of the economic impact of immigration. Recent econometric work on the New Zealand housing market can be extended to specifically address the national and regional impact of varying immigration levels.

Large scale economic models are available in New Zealand that can be used to assess the economy-wide and sectoral implication of varying immigration levels. Using new information on labour market, trade, domestic consumption and technological consequences of immigration, the use of such models would be the final stage of a new programme of research on the economic impact and could significantly improve upon work of this nature conducted during the 1980s.

Further research on the economic impact should also investigate the regional distribution of the impact, and the economy-wide and sectoral effects of student and temporary worker flows.

1. Introduction

Of all forms of international flows, migration flows are the most complex. Overall, a reduction to barriers in international migration benefits not only the migrants, but also the world as a whole, as has been shown in various studies, most recently by Martin (2004) for the Copenhagen Consensus project. However, despite such an overall net economic gain, there are losers and winners in sending and receiving countries and there are many economic, social, institutional and environmental aspects of the impact of migration that go beyond the effect on GDP of a country.

Given the significance of immigration for the societies of sending and receiving countries, there has been a large volume of research on the impact of immigration (and to a lesser extent emigration), particularly coinciding with global liberalisation during the last two decades. The collection of 102 papers in Zimmermann and Bauer (2002); and major surveys such as Borjas (1999a) demonstrate what research has achieved to date. Policy and stakeholder-oriented reviews include Glover et al. (2001) for the UK, Borjas (1999b) for the US, OECD (2003b) for Canada, Roodenburg (2003) for The Netherlands, DIMIA (2002) and OECD (2003a) for Australia, OECD (2003c) for New Zealand; Bauer et al. (2004) for the European Union and Coppel et al. (2001) for OECD countries generally.

Comprehensive research that attempts to assess the full range of economic consequences of immigration is a major undertaking that in the past has tended to be carried out by large teams of researchers, leading to reports of several hundred pages, such as the studies edited by Norman and Meikle (1985) for Australia and by Smith and Edmonston (1997) for the United States. The last comprehensive study of the overall economic impact of immigration in New Zealand was Poot et al. (1988) – not of the same magnitude as the Australian and US studies, but covering macro, labour market and sectoral aspects, and incorporating some public sector stakeholder input.

The question of the economic impact of immigration is particularly important for New Zealand, given that past international inward and outward flows have contributed to a population of which 19 percent was foreign born at the time of the 2001 census. Thus, in-depth insight into the various dimensions of the economic impact of immigration is important for the formulation of policies concerning the admission and settlement of new permanent and long-term residents (through the skilled/business stream, but also through the family-sponsored and humanitarian streams). However, in the current age of high international mobility, migration streams are much more diverse and include temporary work permit holders and students. The latter groups may have a significant impact on the domestic (and local) economy too. Infometrics (2000) calculated estimates of the positive short-run impact, but the long-run effects and spillovers are yet to be investigated. For example, international students may positively affect trade and some may become permanent or long-term highly skilled residents. In addition, repeated migration and circulation is a

phenomenon of growing importance, particularly among professionals, with different policy implications from permanent settlement.

The present scoping paper has three objectives. Firstly, it provides a brief review of recent international empirical research on the labour market impact of immigration. The synthesis of this literature is facilitated by reference to the results from a recent meta-analysis of the impact of immigration on wages. Secondly, the paper briefly reviews international research on other dimensions of the economic impact of immigration, namely productivity and technical change, trade and international relations, the fiscal impact, socio-economic impacts and externalities, and economy-wide (general equilibrium) effects. Thirdly, the paper seeks to identify suggestions for further research that would add to our knowledge of the impact of immigration in New Zealand while being feasible given current, or soon to be available, data.

The international research forms the benchmark against which previous New Zealand-based research is placed. OECD (2003c) noted that while there are comprehensive surveys of the labour market experience of New Zealand migrants (Boyd 2003; Winkelmann and Winkelmann 1998) and the direct contribution to the public sector finances (Nana et al. 2003), there have not been any full scale attempts since Poot et al. (1988) to model the overall and longer term impact of immigration on the labour market and the economy.

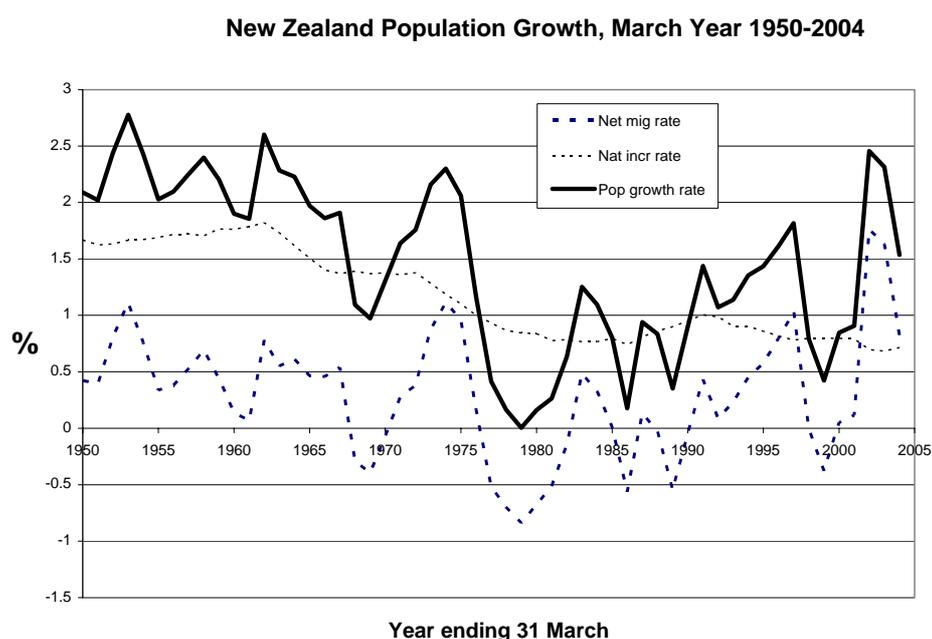
Immigration and emigration

A feature more peculiar to New Zealand than to other developed economies is the extensive and fluctuating international movement of New Zealanders themselves leading – combined with varying numbers of controlled immigration – to strongly fluctuating rates of net migration. This is illustrated in Figure 1.

Figure 1 has been drawn with respect to the estimated de facto population (equivalent to the ‘census night’ population), as from the point of view of domestic demand for everyday goods and services the physical presence of people is more important than their residency status. With this in mind it is clear that net international migration and short term movement can have a major impact on economic conditions in the short run. The balance, however, has been a net inward flow into New Zealand. Aggregated over the quarter century until 31 March 2004, the net inflow has been about 9,000 per year, which accounted for only one quarter of population growth.¹ The small net inflow coincides with an average annual net inflow of some 25,000 foreign citizens ‘substituting’ for a net total of 16,000 departing New Zealand citizens.

¹ Considering the half century until 31 March 2004, net immigration was on average about 8,000 per year and accounted for only one fifth of total population growth.

Figure 1: Population growth in New Zealand: 1950-2004



Source: Statistic New Zealand (total net migration, natural increase); Population Studies Centre (estimated de facto population at 31 March)

However, the present paper is primarily concerned with the movement of persons requiring visas or permits, and research on the free movement of New Zealanders and Australians across the Tasman is not reviewed. However, where migrants are defined by birthplace, Australian migration to New Zealand is included in immigration, although such migrants may well be children of New Zealand citizens returning home.

Emigration may be expected to have important consequences too and there is much research in recent years on the positive benefit that may be obtained from strengthening links with the diaspora. The international research on the potential contribution of diaspora to the sending country includes the theory of Hercowitz and Pines (1997) and the evidence on homeland investment by diaspora residing in the USA by Gillespie et al. (1999). When emigration coincides with a significant loss of human capital, we would expect that this would have a detrimental effect on economic growth. Under certain circumstances, however, a brain drain can be beneficial (see Beine et al. (2001). An important question in the New Zealand case is the extent to which immigration policy aims at compensating quantitatively and qualitatively for a structural long-run net outflow of New Zealanders to Australia and elsewhere. While there may be net losses of workers in specific occupations, the evidence suggests that New Zealand's international migration is on the whole a process of 'brain exchange' rather than brain drain (Glass and Choy 2001).

A classification

In classifying the various types of impact, it is important to distinguish between a short-run and a long-run perspective. This distinction between short-run and long run 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-way classification that is helpful to categorise the various types of economic impact. This is illustrated in Table 1. Topics which have been researched in New Zealand during the last decade are identified in the Table, so that it is easy to gauge where there are major gaps in knowledge in this area.

The intent of the present paper is quite limited. The study of the economic impact of immigration in New Zealand has a long history, starting with Belshaw (1952). The literature up to the mid 1980s was reviewed by Poot (1986) and the literature for the following decade by Chapple et al. (1994). Since then, there have been further reviews, such as Poot (1998) and Winkelmann (2000), but the present paper is in a sense a decadal update of Chapple et al.

However, no attempt is made to provide a complete review of the literature during the last decade. Instead, the same approach is followed for various types of impact. In each case, the main issues are identified first, followed by key international references and, where available, New Zealand references on the particular type of impact. The gaps in NZ research are then identified. Suggestions for feasible New Zealand projects are made and gathered together in the penultimate section.

Table 1: Important Dimensions of the Economic Impact of Immigration

	SHORT-RUN	LONG-RUN
MICRO	<p>Initial migrant wages and (un)employment NZ++</p> <p>Relative wages between and within migrant and native groups</p> <p>Job search</p> <p>Discrimination in the labour market NZ+</p> <p>Housing</p> <p>Effects on other consumption: food, transportation, etc.</p> <p>Migrants' post-settlement human capital investments NZ+</p> <p>Social security</p> <p>Business investment NZ++</p> <p>Saving behaviour</p>	<p>Labour market flexibility</p> <p>Business practices</p> <p>Innovation and entrepreneurship NZ+</p> <p>Migrant adaptation and 'catch up' NZ++</p> <p>Migrant geographical and social clustering NZ+</p> <p>Social mobility across generations</p> <p>Migrants' net fiscal balance over the lifecycle</p> <p>Remittances and international networks</p>
MESO/ MACRO	<p>Population size, composition and geographic distribution NZ++</p> <p>Capacity utilisation, the business cycle and expectations</p> <p>National and sectoral accounts</p> <p>Health and education expenditure, fiscal balance NZ++</p> <p>International balance of payments</p> <p>Unemployment NZ+</p> <p>Aggregate wage level</p> <p>Inflation</p> <p>Interest rates</p> <p>Income distribution</p> <p>Congestion and utilisation of public infrastructure</p>	<p>Fertility and population ageing NZ+</p> <p>Real income per head and the long-run rate of economic growth</p> <p>Sectoral composition of the economy</p> <p>Public and private infrastructure</p> <p>Technological change</p> <p>Economies of scale</p> <p>Total factor productivity</p> <p>Foreign debt</p> <p>Public debt</p> <p>International trade patterns NZ+</p> <p>Social cohesion, cross cultural relations and crime</p> <p>The environment</p>

Note: NZ+ and NZ++ indicate that there has been, respectively, some or extensive post-1994 empirical New Zealand research on this topic

2. Impact of immigration on the labour market

There is a consensus among immigration researchers that, broadly speaking, immigration is not detrimental to the host labour market or economy generally (e.g., OECD (2003c)). However, for policy analysis and a better scientific understanding of the impact of immigration on labour markets and the economy, it is useful to complement such broad qualitative conclusions with a more precise quantitative research synthesis. As was noted in OECD (2003c), there has been little New Zealand research on the impact of immigration on labour market outcomes locally and nationally. A meta-analysis of international research can identify common findings that are also likely to apply to New Zealand, and can also identify research questions that are best addressed with additional New Zealand-based research.

Impact on wages

Most of the research on the labour market impact of immigration has been concerned with the impact of immigration on wages rather than labour force participation or unemployment rates. A recent meta-analysis of the international literature focuses therefore on wages. The results of this study, Longhi et al. (2004), are briefly summarised below.² Borjas (2003, p 1335) recently noted that ‘the measured impact of immigration on the wage of native workers fluctuates widely from study to study (and sometimes even within the same study) but seems to cluster around zero’.³ This observation is rather puzzling from the perspective of standard economic analysis, as an increase in labour supply may be expected to put downward pressure on wages in a competitive labour market. Indeed, a common fear expressed by many people who oppose immigration is that immigration shocks put downward pressure on the wages of those who are potential substitutes for immigrants in the labour market. However, surveys of the empirical literature suggest that the effect of immigration on wages of natives is rather small, often negligible and sometimes even with a positive sign (e.g. Friedberg and Hunt (1995); Borjas (1999a)). These findings appear to contradict standard neoclassical theory in which a positive supply shock in a closed labour market may be expected to lower the price of labour. Three sets of explanations can be put forward: either the conducted econometric analyses have been inappropriate, or there are market forces at work that offset the potential downward effect on wages, or institutional factors stop markets from adjusting as expected following an immigration shock. The first two explanations have been investigated in the

² An extension of this study to the effect of immigration on employment is currently being undertaken.

³ Recent theoretical modelling is also consistent with that. Ben-Gad (2004) develops a neoclassical growth model with overlapping dynasties, which shows that changes in factor prices (i.e. wages and the rate of return to capital) from changes in immigration policy will be very modest.

literature (e.g. Borjas (2003)), but the third one appears at present still under-researched.

The key problem is the non-experimental nature of the two common empirical approaches in the literature. They are the ‘area’ approach and the ‘factor proportions’ approach. The area approach exploits the fact that immigration is spatially highly concentrated, so that a negative spatial correlation may be expected between the proportion of the labour force in local labour markets that are immigrants and the wages of natives who they can substitute for. However, the specification of the regression equation in the area approach is rarely built up from theoretical microfoundations.

In contrast, the factor proportions approach has a much stronger theoretical basis in that it uses a general equilibrium model that can calculate the effect of a supply shock in a market with different types of labour and a specific production technology. However, as in all computable general equilibrium models, the empirical results are derived by means of simulation rather than estimation. Thus, after *assuming* a certain elasticity of substitution between skilled and unskilled workers (usually derived from other studies), it is a foregone conclusion that a migration shock of a particular type of workers will lower the relative wage of all workers of that type. In addition, the factor proportions approach may also suffer from the omission of certain influences on local labour markets such as changes in the composition of demand and capital inflows.

The issue of model misspecification is best illustrated by means of the area approach. The generic regression model to test the impact of immigration on local labour market outcomes is (Borjas (1999a, p 1735),

$$\Delta y_{js}(t, t') = \beta \Delta m_{js}(t, t') + \mathbf{x}_{js}' \boldsymbol{\alpha} + u_{js}(t, t') \quad (1)$$

in which $\Delta y_{js}(t, t')$ is the change between years t and t' in the measure of the labour market outcome experienced by natives who live in region j and belong to skill group s , $\Delta m_{js}(t, t')$ is the change in the stock of immigrants in that region for that skill group over that period, \mathbf{x}_{js} is a vector of control variables with coefficient vector $\boldsymbol{\alpha}$ and u_{js} is the stochastic error. The coefficient of interest is β . Estimates of β vary across studies and even within studies across time periods. There are three potential explanations for this. Either the equations are misspecified due to omitted variable bias, or the migration shock itself is endogenous, or the ‘true’ effect depends on the specific situation that has been analysed (country, period, type of data). The case of a varying parameter β is referred to as the case of heterogeneity in meta-analysis.

With respect to the first issue (misspecification), Borjas (1999a) notes that the wages observed in local labour markets may change over time due to spatial forces that are not well understood and in any case not modelled in the regression equations. With respect to the third issue (heterogeneity), there are statistical tests to identify this (e.g. Shadish and Haddock (1994)). Meta-

regression analysis is commonly used to identify specific causes of heterogeneity.

With respect to the second problem it should be noted that migrants are particularly attracted to regions where wage growth is the most. The endogeneity of the immigrant shock suggests that ordinary least squares (OLS) leads to inconsistent estimates and that an instrumental variable (IV) approach is essential.

One of the main problems in this literature is to find suitable instruments: variables that explain inward immigration, but are not directly related to changes in natives' wages. As governments do not force migrants to settle in specific locations following some 'experimental design' (and in most countries internal migration is free in any case so that the within-country movement of immigrants could offset an exogenous settlement policy), a common instrument is the migrant stock in the previous period. Because there is a well-established fact that migrants cluster and trot well-worn paths from areas of origin to areas of destination (e.g. Gorter et al. (1998)), this instrument usually has a high correlation with current inflows. Nonetheless, the predetermined migrant stock is not a good instrument when there is spatial persistence in wage growth.⁴

Given the problem of finding correct instruments, there has been a search for truly exogenous immigration shocks in local labour markets such as the 1980 influx of Cuban immigrants to Miami (the so-called Mariel boat lift) which increased Miami's labour force by 7 percent almost overnight. By means of the standard difference-in-differences estimator, this 'natural experiment' suggested that the large immigration shock had no impact on Miami's native outcomes (Card (1990)).

The example of the Mariel boatlift suggests that even when very good instruments are available, the wage effect β is still not estimated correctly in (1) and may continue to be small or statistically insignificant due to various processes not being taken into account. These processes include: (i) the growth in local demand due to immigrant expenditures, (ii) the inflow of capital in response to increasing local demand and the increase in the rate of return to capital, (iii) outward migration of natives, (iv) a local re-allocation of resources across sectors and associated adjustment of interregional (and international) trade (the Heckscher-Ohlin effect), (v) and real wage growth of natives due to technological change and/or economies of scale (see Section 3).

Given such endogenous processes following an immigration shock, we can conclude that the wage effect will be larger in more closed labour markets, and it will also be larger in the short run (when the offsetting factors have not had sufficient time to influence the local labour market) than in the long run. This suggests that the wage effect is best measured where there is no native adjustment process possible. A clever approach, adopted by Borjas (2003), focuses on the distribution of workers across levels of experience in the US

⁴ When there is spatial persistence in wage growth, the past migrant stock will be highly correlated with current wage growth and therefore not suitable as an instrument for the current migrant inflow rate.

national labour market, which may be considered closed with respect to natives, as US emigration rates are small. Given the concentration of new immigrants in certain (low) experience groups in the US, the effect on wages of workers in these experience groups can be identified. This research suggests a value for β with respect to weekly wages of around -0.6, which can be converted for the US into an elasticity of -0.4, i.e. a 10 percent supply shock in a particular skill/experience group lowers the wage in that group by 4 percent. It is therefore not surprising that this small wage effect is swamped in practice by the other endogenous processes following an immigration shock outlined above.

There is, however, as yet no agreement on which adjustment process is primarily responsible for the small effect of an immigrant shock on wages. There is, for example, no conclusive evidence that an immigration shock leads to net outward migration of natives. Card and DiNardo (2000) find the opposite effect: the same areas tend to attract both immigrants and natives. However, earlier, Borjas et al. (1997) argued that such observations are spurious due to the spatial variation in the growth paths of regions and correct estimation of the effect of an immigration shock on the local growth path then involves double differencing of the data. After carrying out such double differencing, Borjas et al. (1997) find strong evidence of displacement of natives by immigrants. Borjas (1999a), p.1752 concludes that ‘the specification of a clear counterfactual is crucial in measuring and understanding the link between immigration, native migration decisions, and the impact of immigrants on the wage structure’.

Results from the meta-analysis

Longhi et al. (2004) identified 18 published studies in the international literature on the impact of immigration on wages, spanning research between Grossman’s seminal (1982) study and Borjas’ (2003) study. The studies are listed in Table 2, together with the number of estimates of β (the so-called ‘effect sizes’ in meta-analysis) derived from each of the 18 studies. The total number of collected effect sizes is 348. A histogram of these (excluding three outliers) is given in Figure 2.

The overall mean is -0.119, which can be compared with the recent estimate by Borjas of -0.6 mentioned earlier. The interpretation is as follows. If immigrants increased as a proportion of the labour force by 1 percentage point (e.g. from 10 to 11 percent), the natural logarithm of the average wage would decrease by 0.00119, i.e. wages would decrease on average by a little over 0.1 percent.⁵ For most countries, an increase in the proportion of immigrants in the labour force of one percentage point would be quite a major change. The

⁵ Note that equation (1) is linear. The effect on the local wage is therefore independent of the proportion of the workers that were immigrants before the new influx occurred. In practice some non-linearity (with a declining coefficient for higher proportions of migrants in the labour force) would seem plausible.

impact on wages of such an immigration shock is rather small. Meta-analysis has thus reinforced Borjas' observation of the wage effect of immigration being very small.

However, there is considerable variation around the mean and some of it is systematic. The best way to identify the causes of systematic variation is a meta-regression model. Such a model provides an analysis of variance with study characteristics represented by dummy variables. Across a range of specifications, Longhi et al. (2004) identify a number of robust effects. Firstly, the downward effect on wages is larger in labour markets that have greater institutional rigidities (such as in western Europe) rather than in flexible labour markets in which workers may also have high geographical mobility (such as in the USA). This result is consistent with the evidence of Angrist and Kugler (2001) who found for a panel of European countries in the 1908s and 1990s that reduced flexibility increases the negative impact of immigration. Secondly, studies that don't control for endogeneity of the proportion of immigrants in the local labour market underestimate the effect on wages, because migrants are attracted to regions with higher wage growth. Thirdly, across the studies in the sample, the estimates obtained from factor allocation models tended to be closer to zero (less negative) than those from the area approach.

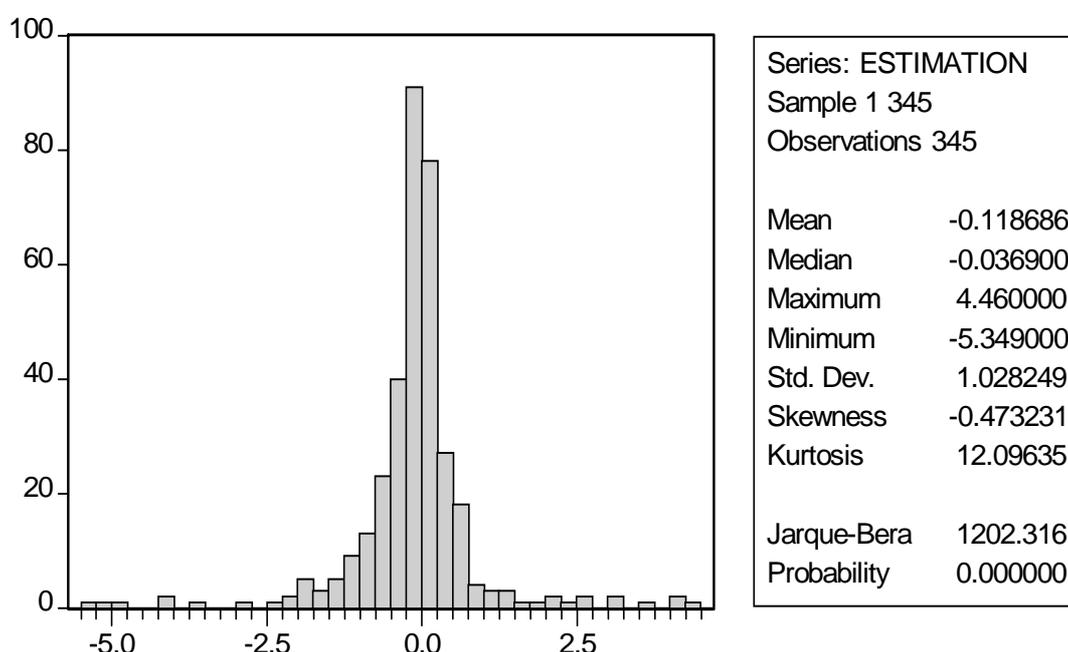
Table 2: International studies on the effect of immigration on wages

Study's Identification Number	Author(s)	Number of Effect Sizes Collected
I	Grossman (1982)	3
II	Borjas (1987)	48
III	Altonji and Card (1991a)	28
IV	Hunt (1992)	5
V	De New and Zimmermann (1994)	8
VI	Enchautegui (1995)	16
VII	Borjas (1996)	20
VIII	Winter-Ebmer and Zweimuller (1996)	8
IX	Greenwood et al (1997)	32
X	Bauer (1998)	18
XI	Pedace (1998)	12
XII	Winter-Ebmer and Zimmermann (1998)	8
XIII	Card (2001)	28
XIV	Friedberg (2001)	15
XV	Addison and Worswick (2002))	23
XVI	Hartog and Zorlu (2002)	20
XVII	Hofer and Huber (2003)	8
XVIII	Borjas (2003)	48
Total		348

Source: Longhi et al. (2004)

Another very robust conclusion is that the wages of earlier immigrants are much more affected by new immigrants than the wages of the native born population. For example, Zorlu and Hartog (2002) provide some evidence for The Netherlands, the United Kingdom and Norway. This is in line with the theoretical expectation, as recent and earlier immigrants tend to be closer substitutes in the labour market than recent immigrants and the locally born. Moreover, studies that identified immigrants in terms of ethnicity, rather than country of birth, or years in the host country were less able to detect a negative impact of immigration on wages. In general, the degree of substitutability or complementarity between skill groups of migrants and natives drives the magnitude of the effect on wages. Much of observed variation in effect sizes across model specifications in the original studies reflect that in most of the studies for Europe and the USA the typical migrant is much lower skilled than the typical native. Thus, highly skilled immigrants then generate a greater downward push on wages of the locals because they are greater substitutes to the average locally born than the reference group (low skilled migrant workers). Conversely, the average immigrant (i.e., low skilled in the US and Europe) has a positive impact on the wage of highly skilled locally-born workers because they are complements rather than substitutes in production.

Figure 2: The distribution of coefficients measuring the impact of immigration on wages



Source: Longhi et al. (2004)

The meta-analysis also suggests that it is important to make a distinction between the effect on hourly wages and the effect on annual earnings. If the labour supply curve of the locally born has the usual positive slope, a

downward effect on the wage would lead to a decline in both hours worked and labour force participation. This would make the effect of an immigration inflow on annual earnings greater than on hourly wages.

Effect on other labour market outcomes

Besides the impact on wages, another important question for policy is the impact on employment outcomes and specifically whether an influx of immigrant workers leads to an increase in the demand for labour in excess of the immigrant supply effect, or to a response in labour supply by the locally born. This can be analysed by looking at the effect on labour force participation and (un)employment rates. However, taking labour market dynamics into account (with transition matrices of flows between states of being in work, unemployed, or out of the labour market), the impact of immigration on layoff rates or hiring rates can also be investigated. Structurally, all these issues can be analysed in the same way as in Equation (1), by replacing the wage variable on the left-hand side with another labour market indicator. The international literature on the impact of immigration on (un)employment is less extensive than on wages and the impact of immigration on labour turnover and transitions appears as yet not researched.

It is in this context important to stress that most research concerned with labour market impact is supply-side oriented, using data on immigrants and locally-born workers. It is equally important, particularly in the context of research on worker-job matching and labour turnover to also consider a demand-side perspective, i.e. to integrate into the analysis data from workplaces and firms.

An example of research on the relationship between immigration and the short-run job prospects of unemployed residents is Chapman and Cobb-Clark (1999). They found that an increase in immigration *increases* unemployed residents' employment probabilities in the short run. These authors developed a theoretical model that was calibrated with data from the first wave of the Longitudinal Survey of Immigrants to Australia.

The difference between the short-run and the long-run impact is not always the same across countries. Gross (2002) found, using French data from the mid 1970s to the mid 1990s, that in the long-run both legal and amnestied immigrant workers and their families lower the unemployment rate permanently but that in the short-run, the arrival of immigrants increases unemployment slightly with an impact effect similar to that of an increase in domestic labour-force participation. As in the case of wage effects of immigration, the composition of the immigration flows matters when assessing the effect on (un)employment and labour force participation rates.

Combining wage and employment effects, the question arises to what extent immigration affects earnings inequality. Reviews of growing earnings inequality such as Katz and Autor (1999) identify immigration as one of the supply-side causes of growing earnings inequality. However, the evidence is

primarily for the US which has had in recent decades rapid growth in unskilled immigration. The question is 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. (2000) show that an increase in skilled labour there through immigration does *reduce* earnings inequality. In any case, even the US evidence suggests that growing income inequality is primarily due to changes in institutional factors and the increasing rate of return to skills and increasing performance-related bonuses for managerial responsibility. Butcher and DiNardo (2002) found that if recent immigrants in 1970 in the US had faced the 1990 wage structure, their wage distribution would have closely resembled that of recent immigrants in 1990.

New Zealand research on labour market outcomes

As was noted by OECD (2003c), research on the labour market impact of immigration in New Zealand has to date been primarily on adaptation of migrants rather than on the impact on the locally born. Some evidence was obtained during the 1980s that net immigration does not operate “to the detriment of the host labour market” (Poot et al. (1988 ,p. 145). This evidence included a macroeconomic study of causality in time-series data on immigration and unemployment (Poot (1986)). This analysis led to the conclusion that the hypothesis that net immigration ‘Granger-caused’ unemployment could be rejected (Poot (1986, pp. 30-31). Shan et al. (1999) updated this type of Granger-causality analysis for Australia and New Zealand. They found that there is no Granger causality running from immigration to unemployment.

In fact, the study of New Zealand’s business cycles during the second half of the last century suggests that net immigration generates a net demand effect in the short-run, potentially leading to higher inflation (in buoyant economic condition) or lower unemployment (in times of a slack labour market) (see Poot et al. (1988)). This conclusion is consistent with the recent evidence by Chapman and Cobb-Clark (1999) for Australia already mentioned earlier. Poot et al. (1988, p. 148) concluded that there is certainly a danger that a deliberate procyclical immigration policy may exacerbate the amplitude of the business cycle.

Comparing the area approach to the factor proportions approach of measuring the labour market impact, it can be argued that the latter has been used in New Zealand, whereas the former has not. The CGE model simulations with the *Joanna* model reported in Poot et al. (1988) can be interpreted as an example of the factor approach, although taking a much wider range of effects into account (such as on preferences, technological change etc.) than overseas studies.

Poot et al. (1988) considered a range of immigration scenarios. The scenario with the most immigration assumed a net inflow of 15,000 persons per annum over a period of 16 years, starting in 1985, A net inflow of 15,000

persons per annum is certainly more than New Zealand's past experience on average. This generates a population that would be 6.15 percent larger than the case with zero net immigration per annum in the end year. The additional labour supply could be absorbed by a decrease in the real wage of no more than 0.3 percent, implying a wage elasticity of about -0.05. This can be made comparable to β in equation (1) by multiplying it by the reciprocal of the associated change in immigration as a proportion of the population.⁶ The appropriate factor for New Zealand is 20.⁷ This would suggest β of about -1, rather to the left of the mean of -0.119 in Figure 2 and also larger than the estimate of -0.6 found by Borjas (2003). But this is a 'base scenario' that ignores any potential dynamic effects of immigration on productivity and efficiency. In what was referred to as a 'plausible scenario' in Poot et al. (1988), the increase in immigration could be absorbed entirely without a decrease in the real wage, suggesting that the value of β would be 0.

Which of these two 'polar' cases is more plausible in practice can be investigated by two different methods. One is to redo CGE simulations, but with building in some empirically derived estimates of the likely effects on productivity. The second is to carry out an area approach regression analysis along the lines of studies such as by Borjas for the USA. Any replication of the area approach in New Zealand would need to exploit that much of the inflow goes to Auckland, as can be seen in Table 3.⁸

An example of a feasible study in New Zealand is a replication of Addison and Worswick (2002), who did a cross-sectional analysis in Australia using data from six consecutive income distribution surveys from 1982 to 1996. New Zealand would have greater regional aggregation, but could use the Income Supplement of the Household Labour Force Survey since 1997.

For estimating the impact of immigration on employment, unemployment and labour turnover indicators, the Household Labour Force Survey would be a valuable source of data. The survey does provide information on respondents' years lived in New Zealand, thus enabling the identification of migrant groups. With the availability of long time series, since 1985, the regions to be used for the analysis can remain quite large as the econometric analysis will primarily be a matter of identifying an effect in Auckland versus 'the rest of New Zealand'. A time-series approach also has the advantage of going across a

⁶ See Longhi et al. (2004).

⁷ The *Joanna* scenarios referred to the period 1985-2001. At the beginning, immigrants were 15 percent of the population. With an influx of 15,000 per annum this would increase to at least 20 percent in 2001, taking the emigration of New Zealanders into account. The difference in the proportions is 0.05 and the reciprocal 20.

⁸ Note that spatial concentration has increased in recent years, coinciding with increased migration from non-traditional sources. Using birthplace statistics the proportion of immigrants is relatively greater in Wellington, because immigrants from traditional source countries were more likely to settle there.

major shift in immigration policy in the early 1990s, thus generating a kind of ‘natural experiment’ (exogenous variation) that by means of a ‘difference-in-differences’ estimator enables the researcher to generate an unbiased estimate.

Table 3: Regional variation in immigration rates in New Zealand

Inflow from Overseas as a percentage of initial population, by Region 1986-2001

	1986-91	1991-96	1996-01
Northland	2.9	3.9	3.4
Auckland	8.5	11.4	12.3
Waikato	3.3	4.3	4.4
Bay of Plenty	3.2	4.4	4.3
Gisborne	1.9	2.6	2.3
Hawke's Bay	2.5	3.3	3.6
Taranaki	2.5	3.2	2.6
Manawatu-Wanganui	3.0	3.6	3.2
Wellington	6.1	5.9	6.3
West Coast	1.8	2.6	2.1
Canterbury	3.4	5.8	5.4
Otago	3.1	5.0	4.5
Southland	1.5	2.2	1.9
Nelson-Tasman	3.5	5.3	4.5
Marlborough	2.5	3.2	3.2
New Zealand	4.8	6.5	6.7

Note: Immigration defined as population usually resident in the region and resident overseas five years earlier as a percentage of the population usually resident in the region at the previous census

Source: New Zealand Census of Population and Dwellings

It would be useful to assess the labour market from the perspective of workplaces and firms, rather than just from the perspective of workers. A first attempt in this direction was made in New Zealand by Benson-Rea et al. (1998) who identified inadequate English language skills, a lack of local work experience and qualification recognition as important barriers for entry into the job market by highly skilled immigrants. Recent work by New Zealand Immigration Service (2003) also includes a survey of employers, but the sample size (387) limit the generalisation possible with this type of data.

The relationship between immigration and the short-run job prospects of unemployed residents can be studied using the Australian example of Chapman and Cobb-Clark (1999). Data from a longitudinal survey of migrants in New Zealand (LisNZ) in New Zealand may permit a similar approach. Dunstan et al.

(2004) describes the introduction of LisNZ and the results of the 2001-2002 two-wave pilot survey.

Another area of potentially interesting research is the measurement of the impact of immigration on internal migration patterns of the locally born. While Choy et al. (2002) argue that migration is a major adjustment mechanism in regional labour markets in New Zealand, the possible migratory responses of New Zealanders (internal and international) in regions that have large immigration inflows (Auckland and Wellington) has yet to be researched, and may be a fruitful avenue for future work on the labour market.

Migrant adaptation

Borjas (1999a) provides an extensive review of how researchers have analysed or should analyse the path of immigrant earnings since arrival, relative to the earnings of comparable natives. An important issue is the rate of convergence of immigrant earnings to native earnings. This is estimated by means of suitably enhanced earnings function, i.e. regression equations that explain the earnings of an individual in terms of human capital and other characteristics. There are several technical problems with this approach, such as the difficulty in identifying separately an effect on earnings of the calendar year of arrival, years since arrival, age at arrival, current age, and labour market experience. 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.

This topic has also been relatively well researched in New Zealand. Following descriptive pioneering work by Poot (1993), Winkelmann and Winkelmann (1998) carried out the first formal econometric analysis of migrant adaptation in New Zealand. More recently, Boyd (2003) and Statistics New Zealand (2004a) provide further descriptive updates. These analyses suggest that after the introduction of the points system in 1992 there was a phase during the 1990s in which skilled migrants had relatively greater difficulty in obtaining suitable employment in New Zealand, but the situation has improved in recent years. Although the recent descriptive updates are useful, further econometric research is needed to update the work of Winkelmann and Winkelmann (1998) and to take innovations in the international literature on migrant earnings functions into account that tries to separate out migrant characteristics (supply) and labour market conditions (demand) effects (see e.g. Borjas (1999a)). It will be particularly interesting to consider adaptation econometrically with LisNZ longitudinal data, once two waves from the full survey become available.

The longitudinal data will be helpful for many other research questions as well. These include the extent to which a bias is introduced in cohort analyses due to selective emigration of immigrants. Income convergence may be observed, for example, simply through selective emigration of those immigrants whose wages remain low in the host labour market. Hence there is

a need to assess whether re-migrants are a random sample of the original survey respondents.

An interesting issue is also the extent to which initial wages of immigrants and the path of their wages over time are location dependent. The spatial concentration of migrants could lead to higher chances of employment (e.g. by immigrants employers) but lower wages (in segmented labour markets). Despite the very well documented geographical concentration of migrants in host countries, research on the effect of such clustering on migrants' labour market outcomes is still remarkably incomplete. There is plenty of theory (such as Lutz (2001), Bauer et al. (2002) and de Graaff and de Groot, (2004)), but little evidence. Aslund et al. (2001) found that ethnic concentration in Sweden actually provided an earnings gain to migrants of 4 to 5 percent. The impact of migrant clustering on natives is briefly discussed in Section 7. Longitudinal surveys in New Zealand may provide useful data to assess the impact of migrant clustering on their wages.

With respect to measurement of wages, it should be noted that New Zealand surveys would have sample size limitations to provide reliable wage data for immigrants (by country of birth and years since arrival), particularly at a regional level. Census data do enable much deeper disaggregation, but the limitations of the census measure of income must be kept in mind.

The catching up of migrants' wages to those of comparable workers may be a process that takes many years and in some cases may not be achieved before retirement. In that case, an interesting question to ask concerns social mobility: do second or higher generations of migrants become virtually indistinguishable from natives? In Australia, the birthplace of the respondent's parents is asked in the population census and this information can be used to study social mobility and the convergence across generations of immigrants. This information is not available from the New Zealand population census.⁹ Intergenerational mobility was taken into account by Smith and Edmonston (1997) in their assessment of the long-run fiscal impact of immigration in the US. This has not been done yet in New Zealand.

Other useful information to assess migrant adaptation in the host labour market is the extent of occupational mobility. In theory, data on this could be obtained through a question of occupation at some previous point in time, but this information is rarely collected. Again, longitudinal surveys such as LisNZ or even SoFIE might provide useful data. There is some in-depth information of migrant adaptation already available in New Zealand, but is primarily for very small samples that may or may not be statistically representative of the immigrant populations (such as those discussed e.g. in Ho et al. (1997) on the adaptation of East Asian migrants in New Zealand).

⁹ A proposed survey of internal migration in New Zealand includes a question of the birthplace of parents, but the sample size may not be large enough to use such a data source for assessing intergenerational social mobility among immigrants.

Permanent residency can be obtained through application from abroad but also through a change of visa status while already in the host country, e.g. on a temporary workers' permit. Are there differences in labour market outcomes, including migrant adaptation, across these two channels of immigrant arrivals? This question, which has obvious policy implications, still needs to be researched.

With respect to immigrant adaptation, an important issue is also the adaptation of those who come in under the humanitarian stream. Some recent US evidence suggests that refugees there adapt generally well. Cortes (2004) finds that 1980 refugee immigrants who arrived in the previous five years did worse than comparable economic immigrants. A decade later, the refugees made greater gains than other migrants. Cortes (2004) explains this by a higher rate of human capital accumulation among refugees.

The post-settlement human capital accumulation of migrants is also an important issue. The wages of migrant workers may increase over time due to further investment in skills. Are the rates of return to such investment the same as for the native born, or maybe even higher? Borjas (1999a) find that there is weak relative complementarity in the US with respect to the skills that immigrants bring with them into the US and the skills they acquire in the post-migration period. In other words, skilled immigrants invest more in further training in the host country than unskilled workers. New Zealand adaptation research to date did not distinguish between pre- and post migration investment in qualifications.

The likelihood of migrants making human capital investments (through further education and training) upon arrival is undoubtedly related to the nature and extent of post-settlement services provided by government agencies. It is commonly argued that New Zealand's immigration services are disproportionately geared toward recruitment rather than post-settlement services. However, such services have been expanded in recent years, although it is questionable whether they have reached the level provided in Australia. The effectiveness of post-settlement services is an important aspect of the economic and labour market impact of immigration. Research in this area falls within the realm of social policy evaluation. Information in LisNZ on the use of post-settlement services may provide useful information for empirical research in this area.

Finally, little is known about self-selection of immigrants to New Zealand relative to those going to other destinations from any given source country. The LisNZ pilot survey suggests that 'lifestyle' is an important reason for migrating to New Zealand and this reconfirms earlier evidence that migrants to New Zealand attach more weight to lifestyle than migrants to other destinations (e.g. mentioned in Poot et al. 1988, (1988, p. 10)). While it is reasonable to assume that "lifestyle migrants" accept lower initial wages and perhaps a lower growth rate in wages than those who are purely motivated by maximising earnings potential, the question whether such self-selection affects outcomes for the host labour market and economy generally remains

unanswered and may be difficult to assess unless some natural experiment can be identified (e.g. variation of the impact of two numerically and qualitatively similar groups of migrants – one group arriving after and motivated by some major overseas calamity (e.g. the Chernobyl disaster or 9/11) and one arriving in relatively less turbulent times). New information on the self-selection of migrants to NZ vis-à-vis other destinations could be researched by means of surveys of emigrants from source countries, where available. Surveys of emigrants from South Africa or from China at the point of departure may be good case studies.

3. Productivity and technological change

A general conclusion from the previous section is that there is little support from the empirical literature that in areas experiencing high levels of inward migration, there are negative labour market outcomes for natives (see also (Schultz 1998) on the US evidence). A number of potential reasons for the apparent lack of correlation between immigrant inflows and changes in wages have been advanced, focusing on the effects of changes in output mix, capital levels, native labour supply responses and productivity (Altonji and Card 1991b; Card 2001; Chiswick et al. 1992; Hanson and Slaughter 1999).

There are three ways in which immigration can lead to greater economic growth.¹⁰ 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 in the short run and long run, which again may boost total factor productivity. We shall discuss each of these in turn.

The first effect of immigration on growth is through equilibrium or ‘steady-state’ effects in open economy growth models. The standard textbook reference for these models is Chapter 9 in Barro and Sala-i-Martin (1995) which develops the Brown model of migration and growth in section 9.1.3. This model allows for perfect capital mobility and imperfect labour mobility in a small open economy model and shows that higher immigration speeds up convergence to the long-run steady state growth rate. Another important reference in this area is Borjas (1999a), who reviews several models of substitution/complementarity between immigrants, natives and capital. Other examples include Nijkamp and Poot (1998) who combines interregional or inter-country labour mobility with endogenous technical change in a spatial growth model and Ben-Gad (2004) who explicitly incorporates the role of ‘imported’ human capital in an endogenous growth model. The importance of immigration coinciding with capital growth is made clear from a simple analysis by Kemnitz (2001). His very simple macro model of endogenous

¹⁰ This section has benefited from the input of Steven Stillman.

growth suggests that immigration will benefit an arbitrary native if and only if the average immigrant possesses more capital than the average native.

There is a variety of empirical work that can be grouped under this heading. For example, Walmsley and Winters (2003) use a global Computable General Equilibrium (CGE) model (see Section 8) to bravely investigate the impact of a freeing up of border controls on the global economy. They conclude that a 3 percent increase in developed economies' quotas on both skilled and unskilled foreign labour would lead to an economic gain of more than 150 billion US dollars. Williamson and Hatton (1994; 1998) examine the relationship between historical migration patterns and long-run economic growth.

With respect to New Zealand, Poot et al. (1998) use the growth accounting framework to examine the relationship between immigration and New Zealand's long-run growth rate. This analysis led to realistic assumptions regarding the expected change in total factor productivity (TFP) and the sector-specific scale effects of immigration that were fed into a CGE model of the New Zealand economy. Simulations with the CGE model then provide estimates of the long-run impact of immigration on macro aggregates such as consumption per head, wages, inflation and the government budget, but also estimates of the impact on specific production sectors and the labour market.

The second way that immigration can affect economic growth is through Schumpeterian innovation. In these models, migrants bring new ideas, work in new industries and occupations, and/or attract trade and FDI from their home countries. Thus, migration can be expected to affect entrepreneurship, innovation, etc. The theoretical work in this area is quite scattered and no obvious main citations exist. A variety of empirical work has looked at entrepreneurial activity by immigrants. For example, Borjas (1986) looks at the self-employment of US migrants. A recent special issue of the *Journal of Ethnic and Migration Studies* (2001) focuses solely on entrepreneurship.

Despite entrepreneurial immigration being a major feature of New Zealand's immigration policy, scientific research in this area is actually rather under-researched and this may have contributed to the rather ad hoc policy changes that have occurred in this area since the early 1990s. Reviews of entrepreneurial immigration include Trlin and Kang (1992), but most of the research in this area is in the form of consultancy reports (such as Forsyte Research, (1998), and Hong, (2001)) rather than journal articles. While recent research by Law and Bryant (2004) shows that immigration may lead to increased international trade (see Section 4 below), there is as yet no strong evidence that this trade effect is greater for entrepreneurial migrants rather than other types of migrants. Ching and Chen (2000) find evidence that trade between Taiwan and Canada is enhanced by self-employed and entrepreneur-type immigrants from Taiwan to Canada, but that the effect of investor class immigrants (those who only need to invest capital passively) on trade was negative. The evaluation of the 1999 Business Immigration Policy by New Zealand Immigration Service (2002) analysed the composition of business

migration to New Zealand and found that the number of Long-Term Business Visa and entrepreneur migrants between 1999 and 2002 were of similar magnitude to the number of Investor migrants, with the latter primarily placing their money in passive investments. The contribution of business migration to innovation, and the spillovers to the economy generally, remain largely unmeasured.

The third way that immigration can affect economic growth is by improving economic efficiency. It can be argued that migrants are more responsive to economic signals because of a lack of 'cumulative inertia' and thus help keep the economy moving. The fact that migrants are younger, on average, also tends to make them more willing and able to adjust to economic change. Immigration also increases the size of the economy, which can potentially lead to more competition and efficiency. However, recent evidence suggests that it is not true that bigger economies perform better on average (e.g. Poot (2004)), although being in geographical proximity of large economy is economically advantageous, all else being equal.

Migrants are also more likely to cluster in major cities which may increase the growth rate through agglomeration effects. Borjas (2001) discusses 'greasing the wheel' models of migration in great detail. The theoretical and empirical work in this paper is very relevant to the link between immigration and growth. In fact, the paper estimates how much immigrants contribute to US GDP by 'greasing the wheels'.

The impact of immigration on productivity has been inadequately researched throughout the world. In New Zealand, the only evidence comes from a macroeconomic causality analysis of net immigration and total factor productivity (TFP) growth, reported in Poot (1993). This analysis showed that there was only a weak effect of immigration Granger causing productivity improvements, but a much stronger effect of net migration responding positively at times when TFP growth was faster than usual. This type of causality analysis has some benefit, is relatively easy to do, and should be updated within a properly specified Vector Autoregression (VAR) model. At the macro level, the argument to justify TFP growth from immigration is a simple investment accelerator story. Immigration generates additional aggregate demand that can only be met by a higher level of production which, in turn, requires a greater capital stock. The new investment needed to increase the capital stock embodies the latest imported or locally-generated innovation. The qualitative improvement in the stock of capital then provides the productivity gains that lead to a higher TFP.

However, the major gap in knowledge here is at the micro-level: the transmission mechanisms through which immigrants increase productivity of individual firms: through 'working and trying harder' or as spillovers of their own skills to the locally born, or through their entrepreneurial activities. Nonetheless, there is a clear concern with immigrant quality, and hence productivity effects, in policy documents (see for instance "The Knowledge

Economy: Six Key Issues for New Zealand to Address” (Ministry of Economic Development 2004)).

The literature on entrepreneurship and immigration is remarkably thin. For example, the earlier mentioned report by Forsyte Research (1998) identified the positive factors and barriers that business migrants faced when setting up businesses in New Zealand. However, this research was based on interviews with a sample of 30 business migrants, so that generalisations are impossible to make. Moreover, no evidence on spillover benefits of the migrants to innovation in New Zealand can be identified. Similarly, a survey of Asian business immigrants in Auckland by Hong (2001) was also based on just 48 respondents. While these surveys may provide useful qualitative information, they are not informative for economic modelling.

Little empirical evidence exists on how immigration affects productivity. The time frame may be important as well. Quispe-Agnoli and Zavodny (2002) examine the relationship between immigration and three factors – output-mix, labour productivity, and capital – in the skilled and unskilled sectors in the U.S. manufacturing sector at the state level. A simple two-sector model is then used to predict the effect of immigration on these three factors. The predictions of the model are then tested using data primarily from the 1982 and 1992 US Census of Manufactures. This study finds that productivity growth is lower in States with high inflows of immigrants than in States that attracted lower levels of immigration. This suggests that immigration lowers productivity growth, which contradicts the growth channels mentioned earlier. However, the authors argue that the productivity effect may be negative in the short run and then turn to positive in the long run. The long-run effect of immigration on productivity has yet to be researched. A problem with replicating a study of this type at a regional level using New Zealand data is the absence of certain types of regional data, such as on certain forms of taxation and the capital stock.¹¹

4. Trade and international relations

A number of recent studies have found that immigration has a positive effect on trade between the immigrants host and home countries (Girma and Yu 2000; Gould 1994; Head and Ries 1998; Ley and Tutchener 2001; Piperakis et al. 2003; Rauch 1999; Rauch and Trindale 1999; Wagner et al. 2002). Two basic causes for this effect have been identified. Firstly, immigrants tend to have a preference for the products from their home countries, as a matter of taste or due to emotional attachment. Secondly, immigrants can reduce transaction costs of bilateral trade with their home countries either through individual characteristics such as business contacts or through more generic traits such as language (Girma and Yu 2000).

¹¹ Quispe-Agnoli and Zavodny include terms for the proportion of state revenue obtained from individual and corporate taxes in their regression analysis.

While the positive correlation between immigration and trade has been generally confirmed, it is important to distinguish the effect on imports from the effect on exports. By and large, the elasticity of the effect of immigration on exports is less than the elasticity of the effect on imports. Several examples will illustrate this. Kohli (2002) found using Swiss data that immigration tends to stimulate imports and to shift the output mix towards non-traded goods, thereby impacting negatively on the trade account. Ching and Chen (2000) found that migration from Taiwan to Canada had a greater impact on imports into Canada than on Canadian exports. Moreover, their study showed, as noted in the previous section, that the composition of the migrant flows matter. Girma and Yu (2000) found – when investigating the link between immigration and trade using U.K. data – that immigration from non-Commonwealth countries had a significant export-enhancing effect. By contrast, immigration from Commonwealth countries was found to have no substantial impact on exports. In another study on Canada, Wagner et al. (2002) found that the effect of the average new immigrant on imports is three times that on exports.

These results are all quite plausible as the short-run macroeconomic effect of immigration is an increase in aggregate demand which is partially met by a greater volume of imports. The effect on exports is less direct (and justifies the assumption of exogenous exports in traditional simple macro models). Thus, it can be concluded that immigration leads to a deteriorating trade balance, at least in the short run. The long run effect is less easy to determine as it is affected by the extent to which efficiency gains due to innovation and scale effects from immigration improve the competitiveness of the country through a lower real exchange rate.

Thus, in the simulations of the impact of higher immigration in New Zealand by Poot et al. (1988), it was found that in the ‘base’ scenario without technological change and economies of scale, population growth due to immigration of 6.15 percent led to deterioration in the balance of payments of -0.86 percent. When such technology-led efficiency gains were incorporated, the balance of payments effect turned slightly positive to 0.07 percent.

In a very recent New Zealand study, Law and Bryant (2004) investigated the relationship between the stock of migrants from a particular country and trade between that country and New Zealand using a modified gravity model of trade, finding that larger migrant stocks were probably associated with higher trade flows although the transaction costs interpretation was not completely supported.

Our review of the literature indicates that the approach adopted by Law and Bryant (2004) has been widely and successfully used internationally, though other approaches do exist.¹² This leads us to the view that further work in this area should be, as Law and Bryant (2004) suggest, directed to elaborating and clarify their findings by employing a higher level of

¹² See for instance Kohli (2002) who employs a production-theory based approach to investigate the impact of non-resident workers on the Swiss economy.

disaggregation of import/export commodity types and under different specifications of elasticities of trade.

Further macro level work in this area needs to be complemented by deeper investigation into the microeconomic causes of the trade effect. Changes in consumer demand (i.e. the preferences effect) are to some extent observable from the Household Economic Survey. The transaction costs effect is less easy to identify but it may be possible to use business directory and labour market data to assess whether firms that have an export orientation are indeed employing a relatively greater number of immigrants than firms that do not. The long-run efficiency gain effect of immigration is linked to the entrepreneurship and investment issues discussed in the previous section, whereby the obvious research question is whether such efficiency gains are greater in the traded goods and services sector than in the non-traded sector.

5. Fiscal impact

Concerns regarding the impact of immigration on fiscal and social policy are widespread, with some politicians and commentators citing an extensive array of largely detrimental effects of high inflows of migrants on indicators ranging from crime rates and house prices to the fiscal sustainability of the welfare state. The fiscal impact is briefly discussed in this section, while issues of social cohesion, crime, housing, etc. addressed in the subsequent sections.

The standard approach to the fiscal impact of immigration in the international literature consists of combining a demographic profile of the population before and after an immigration influx with the cost per capita of providing public consumption and transfer payments. Similarly, tax revenues are estimated based on the incomes and consumption patterns of different demographic groups. This literature suggests, by and large, that the fiscal impact of immigration is positive: immigrants add more to tax revenue than to government consumption or social security payments. The positive impact increases over time (at least up to the time of retirement). For example, Gustafsson and Österberg (2001) found that upon arrival in Sweden immigrants did generate a net burden on the public sector budget, but this was reversed after a few years. Refugees initially put a larger burden on the public sector budget, but the difference with other immigrants declines over the years.

The main cause of the positive net 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 and lower health expenditure, with the net balance being a reduction in total expenditure.

However, it is important to take a lifecycle perspective rather than a single year or 'snapshot' perspective. Studies of the latter type (such as Nana et al. (2003) in New Zealand) are misleading because they do not take the lifecycle 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 arrivals face different sets of fiscal policies, a popular approach to studying the fiscal impact is the methodology of generational accounting that was initially developed by Alan Auerbach, Laurence Kotlikoff and others in the United States to consider the economic impact of population ageing and the net fiscal contribution of various generations facing different tax and social security arrangements. Thus, Auerbach and Oreopoulos ((1999a; 1999b) 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. However, they 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. Other examples of the generational accounting approach are Bonin et al. (2000) for Germany and Collado et al. (2004) for Spain.

Since one of the main concerns with population ageing is the increasing transfers of current income needed to fund consumption of the elderly and since immigration has a positive fiscal impact, it is tempting to suggest that immigration is an alternative policy to higher savings or tax rates in ageing societies. It is certainly the case that immigration can slow down population ageing, but the effect is only small for even large inflows, as was shown for New Zealand by Poot et al. (1988) and more recently by Bryant (2003).¹³ What matters crucially are the forces of demographic change in the overseas born population vis-à-vis the locally born population, such as their re-migration rates but particularly also the fertility behaviour of immigrant families. See for example Rendall and Ball (2004) for a recent UK-based discussion. If immigrant fertility is similar to, or over time converges to, that of the native population, population ageing (which is ultimately driven by sub-replacement fertility) cannot be stopped. Indeed, immigration can be 'addictive' in that, unless a steady inflow of labour force aged migrants is maintained, the fiscal impact of ageing is exacerbated once the cohorts of the last migration wave reach retirement ages themselves.

Following the first pioneering assessment of the fiscal impact by (Poot 1988) the fiscal impact of migration to New Zealand is comprehensively covered in Nana et al. (2003). In their report for the New Zealand Immigration

¹³ Bryant (2003) compared two sets of population projections: one with zero net migration in the long run and the other with net migration of 20,000 persons. The latter scenario implies an inflow of one million migrants over 50 years. However, the effect on dependency ratios is fairly modest: a reduction of the number of dependent per working age person in 2051 from 0.71 to 0.65. The implications for fiscal sustainability are still to be researched.

Service (NZIS) they cover the fiscal impact at both national and sub-national levels, under different levels of immigration, for specific cohorts of migrants and different categories of migrant. They conclude that for all migrant groups, differentiated both by region of residence and duration of residence, the age-adjusted per-capita net fiscal impact was positive.

While Nana et al (2003) and earlier studies provided some useful insights into the fiscal impact of immigration in New Zealand, the limitations of this type of research now need to be addressed as this will affect our understanding of how future immigration policies might influence fiscal balance. These limitations are:

- There is no consideration of emigration of New Zealanders and earlier immigrants. The study is concerned with gross inward migration, not net migration.
- The fiscal impact is calculated in an accounting framework rather than by means of an economic model. Flow-on effects of immigration on the economy are not taken into account.
- As noted earlier, a ‘snapshot’ rather than a generational accounting approach has been taken.

In addition Nana et al. (2003) assume that migrants exhibit expenditure characteristics similar to those born in New Zealand within the same age and income category. Thus differences between sub-groups of immigrants in the fiscal impact are entirely due to differences between such groups in these two characteristics. If other characteristics don’t matter, then this assumption is adequate. For example, Vernez and McCarthy (1997) argue that the use of public services is not related to immigration status. However, there is usually limited information available and this assumption may not always be correct. For example, Tarzwell (2003) argued more recently that greater cultural diversity in Canada (measured in terms of ‘mother tongue’) increased government expenditure levels. Much earlier, Poot et al. (1988) identified in New Zealand, using unpublished household expenditure data, differences in consumption preferences across certain immigrant groups.

In conclusion, it is important to introduce now a generational rather than a cross-sectional “snapshot” approach to assessing the fiscal impact of immigration in New Zealand. Differences in economic profiles of migrant groups should be taken into account. Generational accounting has been done in New Zealand (see e.g. Baker (1999)), but only with *one* migration assumption, namely annual net immigration of 5000.

Besides generational accounting, there is also a need for new research that embeds the fiscal impact into a comprehensive economic model that takes flow-on, economy-wide, sectoral and long-run effects into account. The ideal vehicle for such an analysis is a CGE model. This is essentially what was done by Storesletten (2000) who simulated immigration scenarios with a CGE ‘overlapping generations’ model. A further discussion of CGE models can be found in Section 8.

6. Social cohesion, inequality and crime

In New Zealand, as in many other countries, the development of explicit measures of social cohesion is in its infancy (Statistics New Zealand 2004b) and in many ways remains mired in definitional issues. Peace (2001) provides a discussion of the elusive and challenging nature of the concept of social exclusion/inclusion in the European Union and in New Zealand. Nonetheless, if New Zealand is to be a socially inclusive society, policies for migrants need to be assessed in terms of providing the following elements of social cohesion: a sense of belonging, inclusion, participation, recognition and legitimacy (see Spoonley (2004)). The assessment requires the development of a range of quantitative and qualitative indicators.

It is generally accepted that social cohesion can contribute to better economic outcomes (for a survey, see e.g. Killerby and Wallis (2002)). However, social cohesion is a complex mix of favourable social and economic outcomes, such as adequate incomes, low inequality, low crime, low unemployment etc. While the whole may be more than the contribution of individual factors, economic research has tended to focus on the direct links between measurable indicators and economic growth. It is therefore not surprising then that little work of an econometric nature has been done on the economic impact of immigration through its effect on social cohesion. There are nonetheless some reviews of the issues. Smith and Edmonston (1997) cover the social impact of immigration in the USA in their final chapter. They discuss issues such as the geographical and occupational clustering of immigrants, intermarriage and ethnic identity, education of second and higher generations, language, naturalization, contributions to the arts and sciences, interethnic relations and crime. Some of these issues are also addressed by Borjas (1999b) for the United States and by Glover et al. (2001) for the United Kingdom.

Growing inequality is one factor responsible for a less cohesive society. While there is substantial evidence of growing inequality at national and regional levels in New Zealand (see e.g. Karagedikli et al. (2000)), the relationship with immigration is yet to be investigated. It was noted in Section 2 that overseas research does not consider immigration as the major source of growing inequality. Yet Karagedikli et al. (2000) found that inequality grew the fastest in New Zealand in the metropolitan centres, which are also the main areas where migrants settle. However, the presence or absence of any causal link is still to be investigated.

Internationally, 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 (Martinez and Lee 2000). A brief review of contemporary research into links between crime and ethnicity in general, and migrants in particular, can be found in an Australian study (Mukherjee 1999). Aside from reviewing research from a large number of countries, Mukherjee provides a largely descriptive overview of crime committed by and against migrant groups

in Australia, drawing on censuses of inmates, police arrest data and court records.¹⁴

Such a descriptive overview would provide a valuable starting point for research in New Zealand. However, obtaining appropriate data may prove difficult. Ethnicity data is collected in the Census of Prison Inmates and Home Detainees (Department of Corrections 2003) but country of birth is presently not. The Census of Population and Dwellings does, at least in theory, allow the occupants of prisons and police lock-ups to be identified. This of course unjustifiably equates criminality with prosecution and imprisonment. A significant proportion of offences that occur in a community remain unsolved so that nothing is known about the perpetrators and crimes are in any case frequently unreported (Mukherjee 1999). While the issue of crime is peripheral to issues of economic impact, it should be noted that crime does have linkages with economic conditions. A New Zealand example is the econometric analysis by Papps and Winkelmann (2000), who find significant effects of unemployment on recorded crime. However, given that immigration is more likely to reduce unemployment rather than increase it (see Section 2), this would suggest that immigration could have a downward effect on crime.

With respect to social cohesion, it is important to have information on New Zealanders' attitudes toward immigrants. Recently some survey data on this topic have been collected and results are reported in Gendall (2004) and Ward and Masgoret (2004). Ward and Masgoret show that New Zealanders generally support immigration and a multi-cultural society. However, there are marked Māori/Pakeha differences with the former having less positive attitudes toward immigration, due to seeing immigrants as a source of threat or competition. Given the skill composition of immigration, it remains to be shown by means of labour market impact studies such as reviewed in Section 2 that this threat is real rather than just perceived. A negative real wage effect would require substitutability rather than complementarity between Māori and migrant workers.

With respect to attitudes, it should be noted that there is some evidence of migrant discrimination in the New Zealand labour market. Dunstan et al. (2004) found within a small sample of some 500 pilot LisNZ respondents that one in five immigrants reported experience of discrimination. This is reinforced by a type of experimental research which involved sending fictitious resumes to recruitment agencies by researchers at Victoria University of Wellington.¹⁵ Based on samples of just over 40 resumes of two job applicants, a New Zealand citizen and a Chinese migrant, it was found that the New Zealand candidate was significantly more often asked for further contact than the Chinese candidate, although the resumes indicated equivalent training and experience.

¹⁴ Categorized into The United States, Canada, Germany, Sweden, The Netherlands, Switzerland, The United Kingdom, France, Europe and 'Other'.

¹⁵ Reported on the Internet at www.vuw.ac.nz/cacr/research/immigrant.aspx 4/10/2004.

The causes and extent of such discrimination in the New Zealand labour market obviously warrants further investigation.

7. Spatial clustering and housing

There is extensive evidence that migration is a spatially selective process, with most migrants being attracted to the major cities. Moreover, within cities, immigration has tended to lead to spatial segregation. Such segregation is the result of migrants seeking affordable housing and support of their network of friends and relatives, at the same time facilitated by the outward migration of the locally born. The patterns and impact of migrant clustering are discussed with case studies from several countries in, for example, Gorter et al. (1998). The spatial concentration of migrants may be advantageous for them in terms of the ethnic goods (food, cultural activities, etc.) and support networks. However, ethnic 'enclaves' may affect wages and employment opportunities either positively or negatively. Obviously, spatial segregation has implications for the provision of education, health and other social services. The segregation of immigrants and natives can have spillover effects that may lead to worse economic and social outcomes in the long run. For example, Schnepf (2004) recently concluded with cross-country data on educational achievement that "high clustering of immigrants in some schools is neither favourable for the educational achievement of immigrants nor natives attending these schools" (p.35). As with the discussion of social cohesion, a detailed discussion of the costs and benefits of social clustering is beyond the scope of the present paper.

It is generally believed that the concentration of immigration in Auckland contributes to problems of congestion and urban sprawl. Some policies have been introduced to encourage settlement in other regions. However, the effectiveness of incentives for settlement outside Auckland is still to be researched. For example, do migrants who settle in other regions converge back to Auckland over time, or is internal migration of immigrants a process of dispersion?

The impact of migration at the regional level certainly needs further investigation. This will be addressed in terms of CGE modelling in the next section. Immigration in Auckland is expected to have contributed to a housing boom and buoyant economic conditions. Yet recent research by Hall and McDermott (2004) could not find a relationship between immigration and the regional business cycle. This matter also needs further investigation.

In terms of urban conditions, one area where concern has been voiced over the impact of immigrants has been housing. Using a data base of house prices from the Canada Mortgage and Housing Corporation (CMHC), covering 27 major housing markets and the otherwise inaccessible records of the Canadian Real Estate Association and the Real Estate Board of Greater Vancouver, Ley and Tuchen (2001) examined house price movements in eight Canadian metropolitan areas between 1971 and 1996. They found that while there was considerable similarity in the metropolitan areas considered at

the start of the period, rapid price inflation in Vancouver and Toronto saw from the mid-1980s increasing disparity in the house price structure of the metropolitan areas. Correlation and factor analysis conducted by Ley and Tuchner indicated that for Vancouver and Toronto regional and national factors declined in significance in determining house prices from the mid-1980's, the onset of heavy and concentrated immigration into these cities while indicators of globalisation, such as immigration, became increasingly important.

This type of research can be conducted in New Zealand. The data necessary to replicate this study is available from a combination of Statistics New Zealand, the Real Estate Institute and Quotable Value New Zealand Limited.

Saiz (2003a) also considers the impact of immigration on destination cities. Using instrumental variables based on a 'shift-share' of national levels of immigration into metropolitan areas Saiz examined both the impact of immigration on housing prices and rents and found a pervasive positive association between immigration and both of these variables. Saiz also compared his results with the impact of immigration on labour markets, finding an effect an order of magnitude greater in the housing (and rental) market. The data used in Saiz's study were drawn from US census and immigration data along with rental data from Department of Housing and Urban Development (HUD). Again, comparable data is available from similar sources in New Zealand.

In another interesting paper, Saiz (2003b) followed Card's (1990) natural experiment of the influx into Miami from Cuba (the Mariel boatlift) that was already discussed in Section 2. This exogenous immigration shock added 9 percent to Miami's renter population. Unlike the case of the labour market, where no effects were found, Saiz found that rents increased from 8 to 11 percent more in Miami than in comparable cities and that this rental effect was persistent.

Borjas (2002) considers a different aspect of the relationship between immigration and the housing market, focusing on the determinants of immigrant house ownership, using Public Use Microdata Samples of the 1980 and 1990 decennial U.S. Census, and the 1998-2000 Annual Demographic Files of the Current Population Surveys (CPS). He finds that the differential between native and immigrant groups in homeownership had increased markedly with time. However, only a comparatively small proportion of this difference can be attributed to variables such as household composition or income, whereas locational decisions on the part of migrants appeared to play a significant role in explaining the ownership gap.

It should be noted that housing research using census data has to overcome the usual problem of combining individual census forms (with information on e.g. country of birth and years in NZ) with the household reference person form (with information on housing) and then defining migrant households. In addition, the Statistics New Zealand data laboratory would be

needed to analyse the required census microdata. The available and proposed Confidentialised Unit Record Files (CURFs) would not provide the right data.

8. Economy-wide macro and CGE modeling

The previous sections of this paper reviewed recent research and suggested potential new projects on a range of economic impacts of immigration, such as on wages, technological change, trade, etc. These types of partial analyses provide helpful insights individually, but to assess how a particular immigration policy affects the New Zealand economy overall requires ultimately the integration of all these effects into an economy-wide model. Economy-wide models can be divided into those that focus primarily on macroeconomic outcomes (such as GDP, overall employment, the exchange rate, and the rate of inflation) and models that provide information at the level of sectors of the economy, goods and services traded, and types of workers. One class of models of the latter type is the class of Computable General Equilibrium (CGE) models.

Both macro and micro general equilibrium models have their foundations in neoclassical economics and are built up from microfoundations, i.e. the behaviour of rational individual consumers and firms. Both types of models mimic the working of the market economy in that the price mechanism is expected to determine the allocation of resources such that demand and supply coincide (thereby generating equilibrium).

Macro analyses of immigration with models of the New Zealand economy can be undertaken. This may identify the inflationary effect of immigration for given monetary policy conditions, and the effect on the balance of payments. The RBNZ Forecasting and Policy System Model might be useful in this respect. However, there appears to be little interest by macroeconomists in modelling how immigration shocks affect New Zealand's real and monetary aggregates. Particularly interesting is the question whether the inflationary impact of immigration would in itself be sufficient to induce a corrective response by the Reserve Bank of New Zealand.

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 remain popular throughout the world, particularly for applied analyses of international and interregional trade. At a global level, a

CGE model has recently been used to calculate the gains to the global economy from removing restrictions on international migration (Walmsley and Winters, (2003), already mentioned in Section 3). There are not many CGE analyses of the impact of immigration on individual countries in recent years, but examples are Goto (1996) who assessed the impact of migrant workers on the Japanese economy, Chang (2004) who considered the wage differential between skilled and unskilled labour in Australia, and Sarris and Zografakis (1999) who studied the impact on wages of skilled and unskilled workers due to an inflow of illegal immigrants into Greece.

In New Zealand, the CGE modelling approach was successfully adopted by Poot et al. (1988) to assess the impact of a range of immigration scenarios by means of the *Joanna* model. This analysis is now out of date for a number of reasons:

- The immigration scenarios used in the model reflect the composition of immigration flows as they were in the 1980s, before the major policy changes of the early 1990s. The composition of immigrants has changed drastically since then.
- The structure of the labour market has changed since the 1980s, with a decline in manufacturing and an increase in service sectors. The 1980s *Joanna* model allowed for 18 sectors and just 10 occupational groups, which is not informative enough to study current labour market conditions.
- Fed into the *Joanna* model were calculated effects of the migration scenarios on health, education and social security. Government policies are now very different and recent work on the fiscal impact of demographic change (such as by Creedy and Scobie 2002 and by Nana et al. 2003) would need to be taken into account.
- A major driver of the results reported in Poot et al. (1988) was a set of exogenous impacts of immigration on technological change and economies of scale. These exogenous inputs were calculated by an assessment of changes in Total Factor Productivity (TFP) in relation to New Zealand's post-World War II net immigration and by an independent assessment of the potential to reap economies of scale across New Zealand industries (both inputs reported in Chapter 4). Given globalisation, the impact of ICT on the economy, changes in the size distribution of New Zealand firms, etc. these issues must be re-addressed from scratch, as discussed in Section 3.
- Gross fixed capital formation (investment) is a major determinant of economic growth. The *Joanna* model made strong assumptions about investment, namely that the overall capital-labour ratio and the share of investment in GDP would neither be affected by immigration. Both assumptions need to be investigated with new macro analyses.
- The shifts in domestic demand resulting from different levels of immigration can be taken into account when new household economic

survey data are used to generate information on immigrant expenditure patterns.

- If migrants affect trading patterns, as suggested by Law and Bryant (2004) (see Section 4), such shifts in export and imports can be embedded in CGE model simulations.
- Another issue is the impact of immigration on housing. Because new house building is an important part of overall construction activity and housing outlays are a large component of household expenditure, any new economy-wide modelling requires a reassessment of how the housing sector is affected by immigration.

In conclusion, a CGE model provides the best framework to reassess the economy-wide and in-depth sectoral impacts of immigration. New simulations with a CGE model would not be simply a matter of updating Poot et al. (1988). On many issues related to immigration new knowledge has accumulated in the subsequent decade and a half, both in New Zealand and abroad. It is envisaged that a new CGE analysis would require the input of a wider range of experts than was the case with the 1980s project. A carefully conducted CGE analysis is likely to attract international attention and may lead to replication elsewhere, given that the economic impact of immigration is a growing concern in many developed countries.

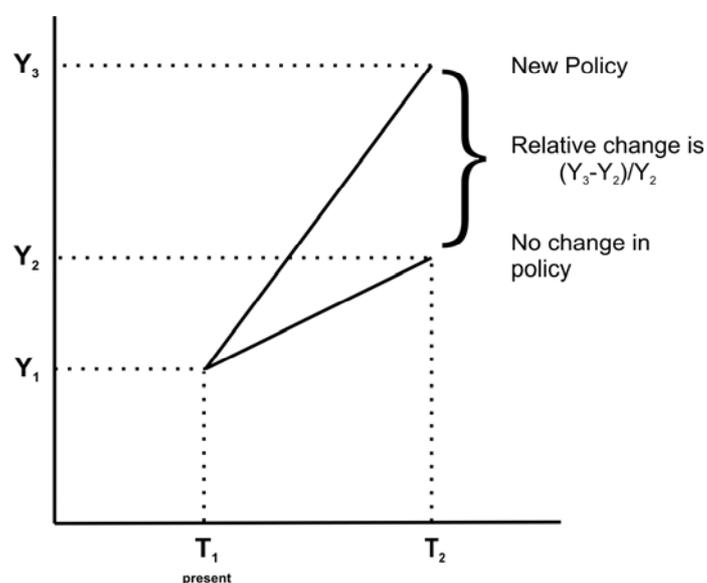
New Zealand has the modelling infrastructure available to do an improved CGE model analysis of immigration. There are two types of models: CGE models that calculate ‘level effects’ and models that calculate ‘change relative to a base scenario’. The distinction is illustrated in Figure 3.

Both models start with the current situation at T_1 , and an observed economic variable Y_1 . Under current policy conditions, a ‘level’ model would calculate that the variable changes to Y_2 at time T_2 . Feeding the new policy into the model leads to a further predicted change to Y_3 .

A model that calculates ‘change relative to base scenario’ is more pragmatic. Such a model would not calculate Y_2 , because it can be argued that many – presently still unknown – factors can change the variable between T_1 and T_2 . The model would simply calculate the relative (percentage) change in Y after the policy change as compared with the base scenario.

The *Joanna* model used by Poot et al. (1988) is of the second type. This approach is particularly useful when looking at long-run changes (ten years or more), because a level model would then require a number of inputs that are hard to predict. However, for forecasting short-run effects (say, up to 5 years), a level model may be more informative.

Figure 3: Assessing ‘level’ or ‘relative change’ effects by means of CGE models



The *Joanna* is currently still in use by BERL in an improved and expanded form.¹⁶ CGE modelling of immigration is effectively similar to another CGE exercise that was conducted earlier this year to assess the economy-wide impact of the release of genetically modified organisms (GMOs) in New Zealand (BERL 2004a). The similarity arises from the fact that both types of simulations require issue-specific exogenous information (consumer attitudes in the case of the GMOs; the demographic composition of the population and the associated effects on average consumer preferences in the case of immigration), the combination of different models (an agricultural trade model and a CGE model in the case of GMOs; models of total factor productivity and/or trade and a CGE model in the case of immigration) and the input of a broad range of experts and stakeholder organisations in both cases.

Another project that has similarities with a CGE analysis of immigration is BERL’s study of expected employment by occupation and industry until 2011, which takes into account projections of export demand, productivity and a range of other economic indicators over the medium term (BERL 2004b). The range of occupations and industries used for both types of analyses are given in the Appendix to this paper. This disaggregates employment into 49 industries and 40 occupations. Such a level of disaggregation of industries and occupations would appear to be sufficiently informative for an immigration CGE analysis as well.

It should be noted that a backbone for CGE modelling is information on inter-industry transactions in New Zealand, also called an input-output table. The latest available information at present appears to be the 1996 input-output table, partially updated. Up to date information on inter-industry transactions

¹⁶ A ‘level effect’ model, like *Joanna* originally developed by the Research Project on Economic Planning at Victoria University of Wellington during the 1980s, is currently in use by Infometrics.

would improve the quality of the results obtained from new analyses with the *Joanna* model.

Given that immigration is highly clustered into a few regions, an important extension to a national-level analysis of the economy-wide effects of immigration would be a *multi-regional* analysis. Again a CGE model is a very suitable tool for this. Multi-regional CGE models are extensively used in Australia (e.g., Groenewold et al. (2003)). Another recent example of multi-regional CGE analysis is Kim and Kim (2003) who assess the impact of growth policies in Korea.

Given the spatial concentration of immigration to the Auckland region, the level of regional disaggregation required need not be very extensive. It is possible that a four-region model that consists of the Auckland and Wellington regions, the rest of the north Island, and the South Island, may be sufficient. The greater the level of spatial disaggregation, the harder it will be to obtain useful regional-level data from the available national surveys.

It should be noted that the applications and policy-oriented CGE models in New Zealand have a high degree of disaggregation, but are restrictive in terms of their assumptions. As noted earlier, the 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, the models are comparative static rather than dynamic. In addition, economic agents in the models (firms and households) do not have forward looking expectations and their decision making also takes place in a one-period setting. Models that relax these restrictions are called dynamic inter-temporal CGE models. An example is Chang (Chang 2004) already mentioned in Section 2. Chang calculated the impact of immigration in Australia on the wage differential between skilled and unskilled labour. It should be stressed that the higher degree of sophistication of such a model compared to the traditional ‘workhorses’ such as *Joanna* is that the sophisticated dynamic models can only be simulated with a high degree of aggregation (i.e., with just a few sectors and skill groups or occupational groups).

9. A wish list of potential research topics

Throughout the previous sections a range of projects have been suggested that could be undertaken in a New Zealand context. Suitable data would be available in principle for most topics, although the Statistics New Zealand data laboratory is likely to be needed for access to micro level data. For some issues (such workplace discrimination) special surveys may need to be conducted. The following topics can be identified from what was earlier discussed in the paper:

- i. The impact of immigration on wages and employment using the geographical area-based approach, the experience-based approach, or

the factor proportions approach, using census or HLFS income supplement data.

- ii. The impact of immigration (including effects of policy changes) on employment, unemployment and labour turnover indicators by means of time series data from the Household Labour Force Survey.
- iii. The relationship between immigration and the short-run job prospects of unemployed residents by means of the methodology of e.g. Chapman and Cobb-Clark (1999).
- iv. The measurement of the impact of immigration on internal and international migration patterns of the locally born.
- v. An update of Winkelmann and Winkelmann (1998) of migrant adaptation by means of econometric earnings functions.
- vi. Selective emigration of former immigrants and the impact on local labour markets.
- vii. The impact of migrant geographical clustering on migrant wages, employment, productivity and innovation.
- viii. The spillover benefits from entrepreneurial migration.
- ix. The relationship between immigration and Total Factor Productivity growth.
- x. The post-settlement human capital accumulation of migrants and differences in rates of return to such investment for migrants and for the native born.
- xi. The efficiency and effectiveness of post-settlement services and assistance.
- xii. Immigrant self-selection and motives for migration to New Zealand.
- xiii. The contribution of business migration to innovation, and the spillovers to the economy generally.
- xiv. The relationship between migration and international trade at a disaggregated level.
- xv. A generational accounting approach to assessing the fiscal impact of immigration.

- xvi. The effect of immigration on income inequality.
- xvii. The incidence and impact of migrant discrimination in the labour market.
- xviii. Internal migration patterns of international migrants.
- xix. The effect of immigration on local housing markets: house prices and rents, new building activity and homeownership rates.
- xx. Macro analysis of immigration with models of the New Zealand economy to assess the impact on GDP, the rate of inflation for given monetary policy conditions, and the effect on the balance of payments.
- xxi. The long-run consequences of the inflow of students.
- xxii. Long-run differences in the economic impact of temporary worker migration and permanent settlement.
- xxiii. The impact of immigration on Gross Fixed Capital Formation (investment) other than housing.
- xxiv. Differentials between immigrant groups in consumption patterns.
- xxv. A full scale CGE model analysis of the economy-wide, sectoral and labour market effects of specific immigration scenarios.

10. Conclusion

Immigration is a complex phenomenon that affects New Zealand in many different ways. This report has been primarily concerned with measurement of economic aspects of the impact of immigration. Qualitative research and broader consequences were outside the scope of the report.

The last literature review of the economic impact of immigration in New Zealand was conducted in 1994 (Chapple et al. 1994). The present report summarised key contributions to the international and New Zealand literature since then and identified major gaps in our understanding of the economic impact of immigration on New Zealand.

While much can be learnt from the international literature, there are many rather unique features of Aotearoa New Zealand (history, the changing birthplaces of migrants, the migration of New Zealanders themselves, the volatility in the flows, the relationship with Australia, etc.) that suggest that many research findings from abroad may not be readily transferable.

Chapple et al. (1994) identified 11 areas in which further research on the economic impact of immigration in NZ was needed. They are (1) descriptive information on recent immigration; (2) substitutability/complementarity of

immigrants and wage effects; (3) distributional issues with respect to taxes/benefits; (4) economic adaptation of immigrants; (5) regional impact of immigration; (6) technical change and economics of scale; (7) attitudes toward immigrants; (8) comprehensive analysis of unemployment effects; (9) immigrant catch up; (10) business immigrants; investment performance; and (11) inflation effects.

While progress has been made during the subsequent decade on some of these topics (specifically (1), (3), (4), (7) and (9)), further research on all these areas is important (given the changes in policies, economic conditions and the composition of immigration flows). Moreover, research on topics (2), (5), (6), (8), (10) and (11) is still non-existent or has been inadequate. In addition, the following areas should also be addressed with new or additional research: (12) trade patterns, tourism and international relations; (13) student flows; (14) temporary worker flows; (15) social cohesion, inequality and crime; (16) housing; (17) the spatial clustering of migrants; and (18) the efficiency and effectiveness of post-settlement assistance.

Chapple et al. (1994) concluded that the major constraint on New Zealand-based research was an absence of suitable data. The data situation has much improved since then with new surveys and better access to data. The availability of unit record data through the Statistics NZ Data Laboratory and the recent introduction of Customised Unit Record Files (CURFs) create great potential for in-depth research. In terms of data sources, it will be clear from the discussion in previous sections that LisNZ will, once the second and, later, the third wave of data are available, provide a powerful data source for immigration research. Nonetheless, there are other surveys in New Zealand that include information of birthplace and/or years lived in New Zealand. With sample sizes of 20,000 or more (and that is the catch, as many surveys have much smaller samples), a sufficient number of immigrants would be captured to lower sampling errors to reasonable levels. An example of a potentially useful survey is the longitudinal Survey of Family, Income and Employment (SoFIE), which will provide detailed information on some 23,000 individuals, including – for foreign born – their years since arrival in NZ and country of birth.

Consequently, the peak of data availability will be reached this decade from around 2007 onwards (when also 2006 Census data will be available), but many projects can be conducted with data presently available and exploit new methodologies and software introduced in overseas research to analyse the data.

Finally, it should be recalled that regulated immigration is only one component of New Zealand's international migration, and the migration of New Zealanders can have major economic consequences too. This suggests that there is a need for a parallel research program on the economic consequences of the free flows of people in and out of New Zealand (with the trans-Tasman flows playing a major role). This paper did not address topics related to such migration of New Zealanders that may nonetheless be of great importance for economic and social policy. Such topics include macroeconomic research on

the impact of overall net migration volatility on the business cycle and long-run growth, research on forecasting migration fluctuations (for example, through an update of Gorbey et al. (1999)), the causes and consequences of skill shortages due to emigration, the effect of the student loan scheme on emigration rates, the potential contributions of our diaspora to the New Zealand economy, the circulation of New Zealand professionals, and causes of fluctuations in the propensity of New Zealanders to return home.

Appendix

Table A.1: Occupational groups in the *Joanna* model

#	Code	OCCUPATION	NZSCO
1	LEGA	Legislators and administrators	11
2	CORP	Corporate managers	12
3	SCIP	Physicists, chemists, mathematicians and related professionals, life science professionals	211, 212, 221
4	COMP	Computing professionals	213
5	AREN	Architects, engineers and related professionals	214
6	HLTP	Health professionals, nursing & midwifery	222, 223
7	TETP	Tertiary teaching professionals	231
8	OTEP	Other teaching professionals	232-235
9	BUSP	Business professionals	241
10	LEGP	Legal professionals	242
11	OTHP	Other professionals	243-245
12	SCIT	Physical science and engineering technicians, life science technicians and related	311, 321
13	CMEC	Computer equipment controllers	312
14	OPEC	Optical and electronic equipment controllers	313
15	OCTS	Ship and aircraft controllers and technicians	314
16	HLAP	Health associate professionals	322, 323
17	FSAP	Finance, sales and administrative associate professionals	331, 332
18	GVAP	Government and social work associate professionals, careers and employment advisors	333, 334, 335
19	OTAP	Safety and health inspectors, environmental protection and other associate professionals	315, 337, 338
20	WAES	Writers, artists, entertainment and sports associate professionals	336
21	OFCK	Office clerks	41
22	CSCK	Customer services clerks	42
23	TRAV	Travel attendants and guides	511
24	REST	Housekeeping and restaurant services workers	512
25	POCW	Personal care and other personal service workers	513, 514
26	PRSW	Protective services workers	515
27	SALE	Salespersons, demonstrators and models	52
28	FARM	Farmers, growers and animal producers	611-612
29	FRST	Forestry and related workers	613
30	FISH	Fishery workers, hunters and trappers	614
31	BDTW	Building trades workers	71
32	MMTW	Metal and machinery trades workers	72
33	PRTW	Precision trades workers	73
34	OCTW	Other craft and related trades workers	74
35	IPMO	Industrial plant operators, stationary machine operators	81, 82
36	RAIL	Railway engine drivers, ships deck crews and related workers	831, 834

37	MOVD	Motor vehicle drivers	832
38	AGEO	Agricultural, earthmoving and other materials handling equipment operators	833
39	BLRW	Building and related workers	84
40	LBSW	Labourers and related elementary service workers	91

Table A.2: Industry groups in the *Joanna* model

#	Code	INDUSTRY	ANZSIC
1	HFRG	Horticulture and fruit growing	A011
2	MLVC	Mixed livestock and cropping	A0121, A0122, A01591
3	SHBF	Sheep and beef cattle farming	A0123-A0125
4	DAIF	Dairy cattle farming	A013
5	OAGR	Other farming and services to agriculture, hunting & trapping	rest A01, A02
6	LOGG	Forestry & logging	A03
7	FISH	Commercial fishing	A04
8	COAL	Coal mining	B11
9	OILG	Oil & gas extraction and exploration	B12, B1511, B1512
10	OMIN	Other mining & quarrying and services to mining	B13, B14, B1514, B1520
11	MEAT	Meat processing	C2111
12	DAIR	Dairy product manufacturing	C212
13	OFOD	Other food processing & mfg	rest C21
14	TCFL	Textiles, clothing, footwear & leather mfg	C22
15	WOOD	Log sawmilling, timber dressing & other wood product mfg	C231, C232
16	PAPR	Paper and paper product mfg	C233, C239
17	PPRM	Printing, publishing & recorded media	C24
18	PETR	Petroleum	C251, C252
19	CHEM	Chemical and chemical product mfg	C253, C254
20	RBPL	Rubber and plastic product mfg	C255, C256
21	NMMP	Non-metallic mineral product mfg	C26
22	BASM	Basic metal manufacturing	C271-C273
23	FABM	Structural, sheet and fabricated metal product mfg	C274-C276
24	MACH	Machinery and equipment mfg	C28
25	OMFG	Other manufacturing	C29
26	EGEN	Electricity generation	D361pt
27	EDIS	Electricity transmission & supply	D361pt
28	GASS	Gas supply	D362
29	WATS	Water supply	D3701
30	BLDG	Construction	E
31	TRDE	Wholesale & retail trade	F, G
32	ACCR	Accommodation, cafes & restaurants	H57
33	ROAD	Road transport	I61, I661
34	WRAI	Water and rail transport	I62, I63, I662
35	AIRS	Air transport, services to transport, storage	I64, I65, I663, I664, I67
36	COMM	Communication services	J71

37	FIIN	Finance and insurance	K
38	OWND	Ownership of owner-occupied dwellings	L771190pt
39	OPRS	Other property services	rest L77
40	SCIT	Scientific research & technical services	L781, L782
41	COMP	Computer services	L783
42	LAOB	Legal, accounting & other business services	L784-L786 (xL7865-66)
43	GOVD	Govt administration & defence	M, Q9631-Q9633
44	SCHL	Pre-school, primary, secondary & other education	N84 (xN843) O871
45	OEDU	Post-school education	N843
46	HOSP	Hospitals, nursing homes, aged accommodation & other community care	O861, O872
47	OHLT	Medical, dental and other health services	rest O86
48	CULT	Cultural and recreational services	P
49	PERS	Personal and other services, pest control and cleaning services, waste disposal & sewerage services	D3702, L7865-66, Q (excl Q9631-Q9633)

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