THE ECONOMIC IMPACTS OF MIGRATION: A COMPARISON OF TWO APPROACHES

This report was prepared for the
Department of Immigration and Multicultural Affairs
by Econtech Pty Ltd.

5 April 2006

CANBERRA HEAD OFFICE

Econtech
P.O. Box 4129
Kingston ACT 2604
Phone: (02) 6295-0527
Fax: (02) 6295-8513
E-mail:office@econtech.com.au

SYDNEY OFFICE

Econtech
Suite 304, 66 Berry Street
North Sydney NSW 2060
Phone: (02) 9929-4700
Fax: (02) 9929-4793
E-mail: sydney@econtech.com.au

Web-site: www.econtech.com.au

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Executive Summary

On 17 January the Productivity Commission released a Position Paper (PCPP) on the "Economic Impacts of Migration and Population Growth". In the PCPP, the Productivity Commission examined the effects of an increase in the level of the skilled migration intake of 50 per cent, which translates to an extra 38,940 skilled migrants per year.

The effects of this policy of higher skilled migration were estimated in a two-step process. In the first step, the Commission estimated the effects of higher skilled migration on the supply of labour, using its own models known as the Labour Supply Projection Model (LSP) and the New Arrival Tracker (NAT). In the second step, the Centre of Policy Studies (CoPS) fed these labour supply effects into the well-known, economy-wide MONASH Model to obtain estimates of the resulting broad economic impacts.

While a larger population leads to a larger economy, the main issue is whether this expansion is accompanied by higher living standards. According to the PCPP, living standards, as measured by Gross National Product (GNP) per capita, are lower than would otherwise be the case for the first 12 years of the policy, but are then higher. After 20 years, the gain in GNP per capita reaches 0.6 per cent.

For this current report, the Department of Immigration and Multicultural Affairs (DIMA) commissioned Econtech to compare the results of its own modelling of the economic impacts of the extra skilled migration intake with the results from the PCPP. For this purpose, Econtech conducted the same simulation of an increase in skilled migration of 50 per cent using its own Migration Modelling Framework.

The Migration Modelling Framework is a long-established, integrated modelling system for estimating the demographic and economic impacts of migration. The development of this system started in 1991 when the former Bureau of Immigration Research commissioned Econtech to construct a demographic model (MM2-Demographic) and link it with its economy-wide Murphy Model (MM). The purpose of this modelling system was to analyse the economic effects of alternative migration policies. Updated versions of this modelling system, which now uses Murphy Model 2 (MM2), have been used by Econtech in a series of studies for the DIMA over the years, most recently in Econtech (2004b). The most recent report was presented by Econtech to the Productivity Commission team at their invitation on 25 August 2005.

The economic effects obtained using the Migration Modelling Framework are materially more favourable than those found in the PCPP. In particular, the initial drop in living standards is more mild and less protracted, and after 20 years the gain in living standards reaches 1.1 per cent, compared with the PCPP estimate of 0.6 per cent.[1] This is a material difference for assessing the economic merits of the skilled migration program. Like the PCPP Modelling Framework, Econtech's Migration Modelling Framework finds a minimal impact of skilled migration on the unemployment rate, although for a different reason.

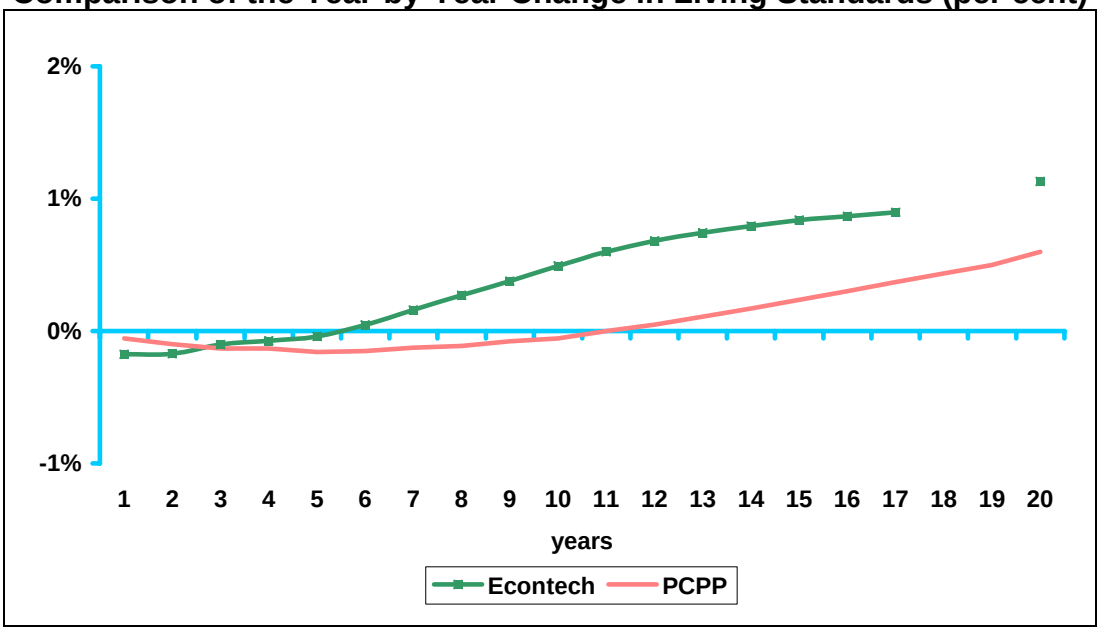
These living standards and unemployment results are discussed (and compared) in more detail below.

[1] The PCPP uses real GNP per capita as the estimate of living standards while Econtech uses real consumption per capita as the estimate of living standards. For comparability, results are expressed in percentage terms in this report.

Comparison of Annual Living Standards Effects

As discussed above, the main issue of the expansion in the economy stimulated by the extra skilled migration intake is whether this expansion is accompanied by higher living standards. For the PCPP, Chart A shows that living standards are lower for the first 12 years of the increased skilled migration policy, but are then higher and after 20 years, the gain in living standards reaches 0.6 per cent. Econtech conducted the same simulation of an increase in skilled migration of 50 per cent and the economic effects are materially more favourable than those found in the PCPP. In particular, Chart A shows that the initial drop in living standards is more mild and less protracted, and after 20 years, the gain in living standards reaches 1.1 per cent, compared with the PCPP estimate of 0.6 per cent.

Chart A
Comparison of the Year-by-Year Change in Living Standards (per cent)



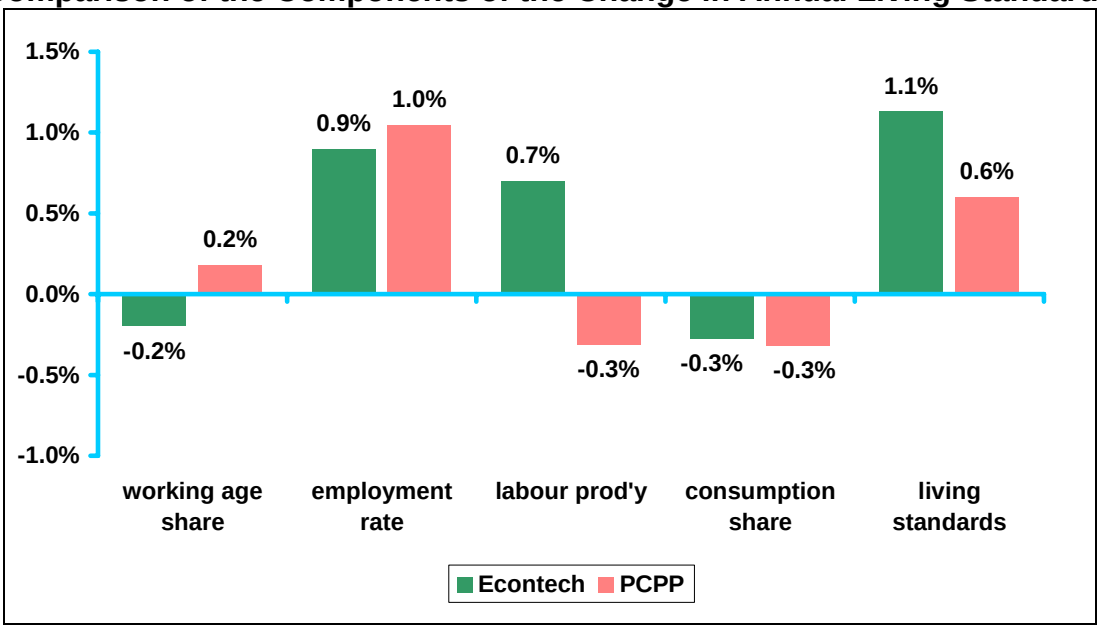
Sources: Migration Modelling Framework, PCPP Modelling Framework
Notes: The PCPP uses real GNP per capita as the estimate of living standards while Econtech uses real consumption per capita as the estimate of living standards.

For both modelling frameworks, Chart B compares the contribution to the long-term results for annual living standards from the following four distinct channels:

- the working-age share of the population;
- the employment rate;
- labour productivity; and
- the ratio of consumption to GDP.

The chart shows significant differences between the estimates of the two modelling frameworks for the first and third channels but similar estimates for the second and fourth channels. The contribution of each channel is discussed (and compared) in turn below.

Chart B
Comparison of the Components of the Change in Annual Living Standards



Sources: Migration Modelling Framework, PCPP Modelling Framework
Notes: The PCPP uses real GNP per capita as the estimate of living standards while Econtech uses real consumption per capita as the estimate of living standards.

Working-Age Share of the Population

Chart B shows a difference through the working-age share (15 years and over) of the population channel. Specifically, there is a contribution to living standards of about 0.2 per cent through this channel under the PCPP Modelling Framework but a fall of about 0.2 per cent under Econtech's Migration Modelling Framework.

The reason for this difference is that the PCPP population projections omit the births to the extra skilled migrants after they arrive in Australia, which understates the boost to the population from the extra skilled migration intake. This understatement of the population gain leads to overstatement of the gain in consumption per head of population by about 0.4 per cent.

Employment Rate

Chart B shows that there are similar gains in living standards in the long-term from the employment rate channel for both modelling frameworks. The similarity of estimates confirms that the extra skilled migration intake lifts participation rates and this is due to differences in the age-gender mixes of the migrants versus the existing population. In particular, the prime working-age group (aged 15-39) is strongly over-represented in the migration intake.

Labour Productivity

The third channel is labour productivity, which provides the largest difference between the two estimates of the impact of the extra skilled migration intake on annual living standards. As seen in Chart 5.2, under the PCPP Modelling Framework, the extra skilled migration intake leads to a fall in labour productivity of about 0.3 per cent while under Econtech's Migration Modelling Framework, the extra skilled migration intake stimulates a rise in

labour productivity of about 0.7 per cent. Thus, in the PCPP modelling, the labour productivity effect detracts 1.0 per cent from the gain in living standards compared with the Econtech modelling.

The Econtech result is simple to explain. Extra skilled migration adds 0.6 per cent to the labour force skill index. This increase in the efficiency of the labour force of 0.6 per cent leads to a similar increase in labour productivity of 0.7 per cent.

By comparison, the PCPP modelling is based on a lower increase in labour force skill of 0.4 per cent. The smaller gain in labour force skill reflects the fact that, according to the PCPP modelling, the educational attainment mix for skilled migrants is only marginally superior to that of all migrants, which is highly implausible. This problem probably accounts for the fact that extra skilled migration adds only 0.4 per cent to the skill level of the workforce in the PCPP modelling compared with the Econtech estimate of 0.6 per cent.

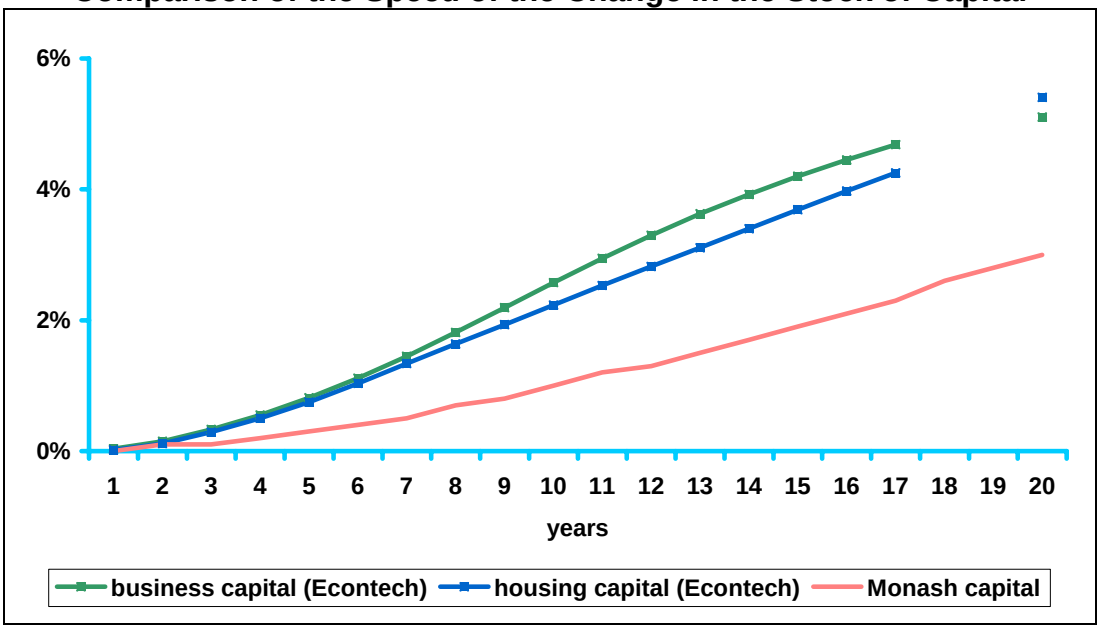
Even so, this smaller gain in skill in the PCPP modelling is not sufficient to explain the big difference in labour productivity effects from the Econtech modelling. The PCPP modelling is 0.2 per cent lower for the skill index but 1.0 per cent lower for labour productivity. Put another way, the PCPP modelling implies a gain in labour skill of 0.4 per cent yet labour productivity falls by 0.3 per cent. This runs counter to expectations from standard models which imply that labour productivity should rise with labour skills.

The main reason for this non-standard result in the PCPP modelling is a very slow rate of adjustment of capital to the increase in population caused by the extra skilled migration intake. After 20 years, the capital stock is only just over half way to adjusting to reach its new equilibrium path. This implied sharp fall in the ratio of capital to labour (measured in efficiency units) reduces labour productivity. In contrast, under Econtech's Migration Modelling Framework, both business and housing capital adjust more quickly so that the economy is near its new equilibrium path after 20 years.

Chart C compares the adjustment of capital stocks in the two models. The dots on the right of the chart are from the steady equilibrium paths of the capital stocks and represent long run estimates of the change in capital stocks. These estimates were obtained using the long run properties of MM2. The solid lines in the chart are from the actual dynamic paths of the models and show the dynamic path of the change in capital stocks over 17 years for MM2 and over 20 years for Monash. Comparing the solid lines with the dots, it can be seen that the housing and business capital stocks in MM2 are on a trajectory over 17 years that will take them close to the steady equilibrium paths by year 20. In contrast, the capital stock for Monash is only just over one half of the way to the equilibrium path. This results in the sharp fall in the ratio of capital to labour measured in efficiency units that was described above, and hence the fall in labour productivity.

The Monash result that, even after 20 years, industry is only able to complete just over one half of the adjustment in capital to a higher skilled migration intake is completely implausible. It is usually suggested that the "long run" is after 5 to 10 years but these PCPP results are still far from the long run after 20 years.

Chart C
Comparison of the Speed of the Change in the Stock of Capital



Sources: Migration Modelling Framework, PCPP Modelling Framework

If PCPP modelling were adjusted to allow for a more plausible rate of adjustment of capital to the extra skilled migrants, and if apparent problems in the calculation of the educational attainment mix for skilled migrants were corrected, then the PCPP modelling would show a more positive outcome for labour productivity. In particular, it could be expected to show a gain in labour productivity similar to the Econtech estimate of 0.7 per cent, instead of a fall of 0.3 per cent. This would add 1.0 percentage points to its estimate of the gain in living standards after 20 years.

Consumption Share of GDP

Finally, Chart B shows that there are similar contributions to living standards through the consumption share of GDP channel for both modelling frameworks. In both cases, the consumption share of GDP detracts 0.3 percentage points from the gain in living standards. This similarity disguises offsetting differences in two effects on the consumption share of GDP. These two effects relate to migrant transfers and the terms of trade.

On the one hand, the Econtech modelling takes into account that skilled migrant categories are able to partially finance the extra investment in business capital and housing created by their migration, while the PCPP modelling apparently assumes that they make no contribution at all ie. have zero net assets.

On the other hand, Econtech estimates that the terms-of-trade falls by about 1.1 per cent while the PCPP estimates the terms-of-trade falls by about 0.6 per cent. This fall in the terms-of-trade occurs because export prices fall as an expanded Australian economy moves to increase its share of world trade. A lower terms-of-trade means that the same volume of exports can be exchanged for a lower volume of imports, leading to lower living standards.

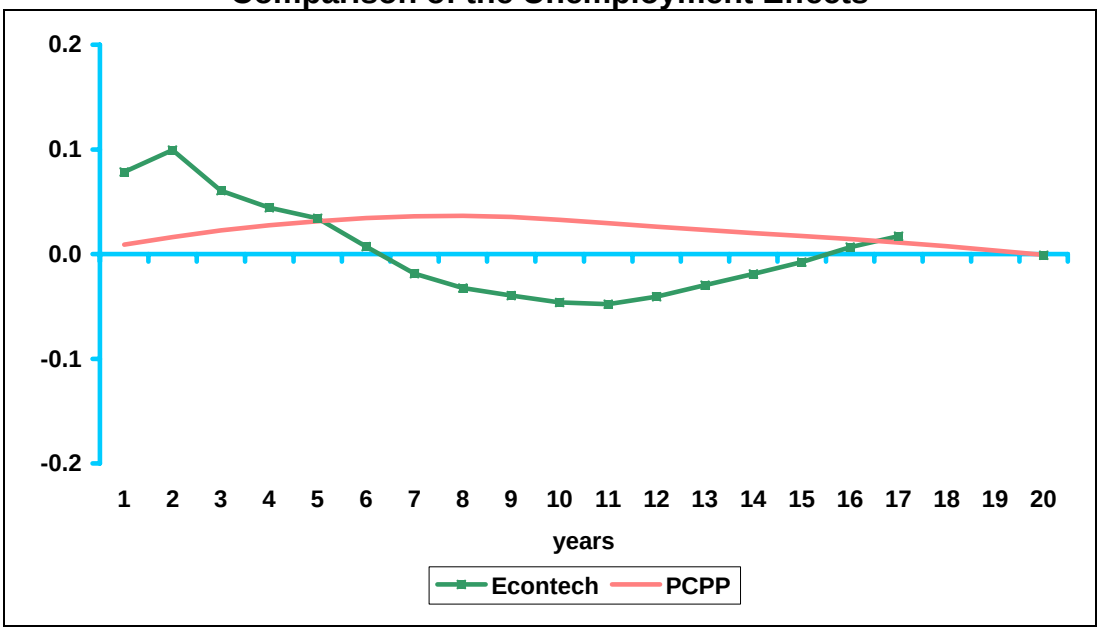
Overall, the two models show a similar effect on the consumption share of GDP. This is because Econtech's larger terms-of-trade effect offsets the fact that Econtech also allows for

migrant transfers. Thus, both modelling approaches lead to the same estimate that the consumption share of GDP is reduced by 0.3 per cent.

Comparison of Unemployment Effects

Chart E shows that both modelling frameworks find that the extra skilled migration intake has a minimal impact on the unemployment rate, although for a different reason. Specifically, for Econtech's Migration Modelling Framework, the minimal impact of the extra skilled migration reflects separate modelling of labour demand and supply. Wage adjustment means there is gradual adjustment of the unemployment rate towards the non-accelerating inflation rate of unemployment (NAIRU) in the long-term.

Chart E
Comparison of the Unemployment Effects



Sources: Migration Modelling Framework, PCPP Modelling Framework

In contrast, under the PCPP Modelling Framework, employment of existing Australian residents is held fixed, and the unemployment effects reflect the historical labour market experiences of migrants in the years after they settle. A 10-year migrant acclimatisation period accounts for the temporary elevation in unemployment seen in Chart 5.5 for the PCPP modelling. The PCPP approach of holding unemployment of existing Australian residents fixed under the increased skilled migration scenario assumes away one of the main issues of interest in migration modelling.

Both modelling approaches find minimal effects on unemployment but for different reasons. Further, neither modelling approach takes into account that by some targeting of skills in short supply, the extra skilled migration intake is likely to reduce jobs mismatch, leading to some long-term reduction in unemployment. It is therefore likely that they understate the benefits from increased skilled migration.

1 Introduction

On 17 January the Productivity Commission released a Position Paper (PCPP) on the "Economic Impacts of Migration and Population Growth". In the PCPP, the Productivity Commission examined the effects of an increase in the level of the skilled migration intake of 50 per cent, which translates to an extra 38,940 skilled migrants per year.

The effects of this policy of higher skilled migration were estimated in a two-step process. In the first step, the Commission estimated the effects of higher skilled migration on the supply of labour, using its own models known as the Labour Supply Projection Model (LSP) and the New Arrival Tracker (NAT). In the second step, the Centre of Policy Studies (CoPS) fed these labour supply effects into the well-known, economy-wide MONASH Model to obtain estimates of the resulting broad economic impacts. This followed the issuing of a consultant's brief by the Productivity Commission (2005b) that required that this economic modelling be undertaken using the MONASH Model.

While a larger population leads to a larger economy, the main issue is whether this expansion is accompanied by higher living standards. According to the PCPP, living standards are lower than would otherwise be the case for the first 12 years of the policy, but are then higher. After 20 years, the gain in GNP per capita reaches 0.6 per cent. Another issue is the impact of higher skilled migration on unemployment.

Econtech has a long-established, integrated modelling system for estimating the demographic and economic impacts of migration. In 1991, the former Bureau of Immigration Research commissioned Econtech to construct a demographic model (MM2-Demographic) and link it with its economy-wide Murphy Model (MM). The purpose of this modelling system was to analyse the economic effects of alternative migration policies. Updated versions of this modelling system, which now uses Murphy Model 2 (MM2), have been used by Econtech in a series of studies for the Department of Immigration and Multicultural Affairs (DIMA) over the years, most recently in Econtech (2004b). The most recent report was presented by Econtech to the Productivity Commission team at their invitation on 25 August 2005.

In the current report, Econtech compares its modelling of the economic impacts of migration with that undertaken by the Productivity Commission. For this purpose, Econtech conducted the same simulation of an increase in skilled migration of 50 per cent. The economic effects are materially more favourable than those found in the PCPP. In particular, the initial drop in living standards is more mild and less protracted, and after 20 years the gain in living standards reaches 1.1 per cent, compared with the PCPP estimate of 0.6 per cent. This is a material difference for assessing the economic merits of the skilled migration program. Like the PCPP modelling, the Econtech modelling finds a minimal impact of skilled migration on the unemployment rate, although for a different reason.

Based on the analysis in this paper, Econtech considers its results to have a firmer base, reflecting a greater level of development of the interface between the demographic modelling and the economic modelling. That is, the differences in results between the two modelling exercises are due not so much to the nature of the labour force and economic models that are used, but rather how they have (or haven't) been linked.

This report is structured as follows.

- Section 2 examines the main principles involved in analysing the economic effects of skilled migration.
- Section 3 outlines Econtech's Migration Modelling Framework.
- Section 4 compares how increased skilled migration is reflected in the inputs fed into the two models.
- Section 5 compares the resulting outputs from the two models, focussing on the effects on living standards and unemployment.

While all care, skill and consideration has been used in the preparation of this report, the findings refer to the terms of reference of the Department of Immigration and Multicultural Affairs and are designed to be used only for the specific purpose set out below. If you believe that your terms of reference are different from those set out below, or you wish to use this work or information contained within it for another purpose, please contact us.

The specific purpose of this report is to identify the key underlying differences between the PCPP and Econtech modelling and analyse their implications for the modelling results.

The findings in this report are subject to unavoidable statistical variation. While all care has been taken to ensure that the statistical variation is kept to a minimum, care should be used whenever using this information. This report only takes into account information available to Econtech up to the date of this report and so its findings may be affected by new information. Should you require clarification of any material, please contact us.

2 Principles in Economic Modelling of Migration

The MONASH and MM2 models both use old growth theory (in the tradition of the Swan-Solow model) rather than new growth theory. This means that the long-run growth rate is tied to demographic factors — population growth, the structure of the labour force and the rate of improvement in labour efficiency — which are exogenous, rather than endogenous, to the economic model.

This implies that these models are not subject to "scale effects" in which an increase in the scale of the economy affects the long-run growth rate. Perhaps this is just as well since Turnovsky (2000) reports that the empirical evidence does not support the existence of scale effects.

In any case, the use of old growth theory means that migration has relatively straightforward effects on economic growth. The following discussion of those effects is in general terms. The reader seeking a rigorous justification for the claims that are made can refer to the simple model in Box 2.1 and the associated technical discussion that is relegated to footnotes. The simple model in Box 2.1 is an open economy version of an old growth theory model. While the MONASH and MM2 models are far more complex than the simple model, it nevertheless provides some key insights. In particular, it can be used to show how certain economic attributes of migrants affect national living standards.

The main issue is the impact of higher migration on living standards. Higher migration has the immediate effect of raising the rate of population growth (population growth effect). It also has the steadily-developing effect of raising the level of the population (population level effect) relative to a baseline scenario without higher migration. These two effects are now considered in turn.

2.1 Population Growth Effect

A higher rate of population growth will require a higher rate of growth in infrastructure and hence a higher rate of investment[2]. In the short-term, production will be constrained by the capital and labour already in place, raising the issue of whether the necessary boost in investment is provided for out of lower consumption (i.e. living standards) or whether it can be absorbed by a lower trade balance[3].

[2] In equation (2) "g" rises causing "I" to rise, specifically:
d(I) = K*d(g).
[3] In equation (1), "Y" is determined elsewhere so the rise in "I" must be offset by a fall in "C" or "NX".

Box 2.1
Simple Open Economy Steady State Growth Model

National Income Identity

$$Y = C + I + NX \quad (1)$$

Investment

$$I = (\delta + g)*K \quad (2)$$

Production

$$Y = f(K,N) \quad (3)$$

Marginal Product of Labour Condition

$$W = f_n(K/N) \quad (4)$$

Marginal Product of Capital Condition

$$\delta + r = f_n(K/N) \quad (5)$$

External Balance

$$NX = (r-g)*KF - TRF \quad (6)$$

Migrant Transfers

$$TRF = m*rel*KL \quad (7)$$

Ownership of Capital

$$K = KL + KF \quad (8)$$

Definitions of Endogenous Variables:

Y = GDP
C = consumption
I = gross investment
NX = net exports
K = capital
KF = capital: foreign-owned component
TRF = migrant transfers
W = real wage per efficiency unit of labour

Definitions of Exogenous Variables/Parameters:

N = employment (efficiency units)
g = rate of growth of N
KL = capital: locally-owned component
r = cost of capital (determined on world capital markets)
m = contribution of migration program to g
rel = average financial transfer per migrant relative to average financial wealth of existing residents
δ = rate of depreciation

Not surprisingly, it turns out that, if the typical additional migrant is equivalent in economic terms to existing residents, living standards are unaffected. Such a migrant by definition is as financially wealthy as existing residents and brings to Australia precisely the amount of funds required to finance the needed boost to investment[4]. This migrant transfer of funds broadly offsets the impact on the balance of payments of a reduced trade balance, leaving the ratio of foreign liabilities to GDP completely undisturbed.

This suggests that the initial impacts of higher migration on living standards would be benign if the additional migrants are equivalent in economic terms to existing residents. In practice it turns out that the average migrant, even for the skilled program, is less financially wealthy than the average existing resident. This means that the average skilled migrant does not bring sufficient funds to fully finance his or her investment demands, leading to a short-term dip in living standards.

The potential implications of this can be understood by considering the extreme case where migrants bring no assets with them. In that case, the "population growth effect" results in the following drop in living standards.

% change in living standards =
– ratio of wealth to consumption X change in population growth rate[5]

The simulated increase in skilled migration of 50 per cent adds around 0.2 percentage points to annual population growth. Applying this to a wealth to consumption ratio conservatively assumed to be 5 gives a potential loss in living standards of 1.0 per cent. In practice, the impact is less than this because migrants bring substantial assets with them, although they are less wealthy on average than existing residents.

A more sophisticated analysis would take into account that the lower average wealth of migrants compared with existing residents can be partly explained by the age distribution of migrants. As will be seen later, migrants are younger on average than existing residents and hence have had less time to accumulate assets. These age-related aspects of asset accumulation would be best taken into account by employing an overlapping generations model of saving, as discussed below in Section 2.3.

In any case, the average skilled migrant is wealthier than the average existing resident when human wealth is also taken into account in addition to financial wealth. This leads to a mounting, favourable "population level effect", which is now examined.

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[4] The equally-wealthy, additional migrant (rel = 1) would bring additional migrant transfers in equation (7) of:

$$d(TRF) = KL*d(m) = KL*d(g)$$

Using this result in equation (6) gives:

$$d(NX) = –KF*d(g) – KL*d(g)$$

Using equation (8) this simplifies to:

$$d(NX) = –K*d(g)$$

This fall in the trade balance exactly offsets the rise in investment calculated in footnote 1, allowing living standards ("C") to remain unchanged in equation (1).

[5] That is:

$$d(C)/C = –(KL/C)*d(g)$$

2.2 Population Level Effect

As time goes by, a higher level of migration will lead to a mounting gain in the population, relative to a baseline scenario without the higher level of migration. The economic impacts of this mounting gain in the population level are straightforward under old growth theory.

In this simple world, the economy is fully scalable if the additional skilled migrants are economically equivalent to existing residents. After 20 years, the increase in skilled migration means that the population would be around 4 per cent higher than it would otherwise be. If the skilled migrants were economically equivalent to existing residents, then this would mean that the economy would also expand by about 4 per cent, relative to the baseline scenario[6]. This assumes constant returns to scale in production, as discussed further in Section 2.3.

This simple expansion of the economy would leave living standards unaffected. While consumption would be 4 per cent higher than otherwise, so would the population, leaving consumption per capita unaffected. Similarly, real wages would be unaffected.

In reality, the typical skilled migrant is significantly more productive than the typical existing resident – on average they are more skilled and have a higher labour force participation rate, giving them higher human wealth. This means that while over 20 years the higher level of skilled migration is expected to expand the population by about 4 per cent, it can be expected to expand employment (measured in efficiency units) by a substantially higher percentage. This flows through to similarly higher percentage gains in production and capital.[7]

At the same time, the percentage gains in consumption will fall short of the percentage gains in GDP[8]. This is because skilled migrants do not have a premium in financial wealth to match their premium in human wealth. The final gain in living standards can be measured by the extent to which the percentage gain in consumption exceeds the percentage gain in population i.e. the percentage gain in consumption per capita.

2.3 Migration and Living Standards

The main conclusion from this simple analysis is that higher skilled migration can boost living standards to the extent that the additional skilled migrants are wealthier – in human or financial terms – than existing residents. Going beyond this simple analysis, there are also other potential non-neutralities through which migration may affect living standards.

The simple open economy model adopts the simple assumption that the economy is perfectly scalable. In reality, there may be significant economies or diseconomies of scale in production or externalities that mean the economy is not perfectly scalable.

It is well established that there are significant economies of scale in networks. This includes telecommunications, postal, electricity, gas and water networks. For example, the ACCC

[6] Specifically, if skilled migrants were economically equivalent to existing residents, N, K, Y, KL, KF and C would all expand by the same 4 per cent.
[7] That is, because skilled migrants are more productive than existing residents, N, Y and K expand by more than 4 per cent, where N is employment measured in efficiency units.
[8] That is, the percentage gain in C will fall short of the percentage gain in Y.

(2005) has recently estimated that monthly network costs per line for Telstra's copper Customer Access Network (CAN) range from $4 in CBDs to $13 in metropolitan areas, $27 in regional areas and $149 in remote areas. These differences reflect the fact that higher population density leads to higher line density, and therefore lower costs per line. It follows that an increase in population density from an expanded population would reduce telecommunications network costs per capita, leading to higher living standards.

On the other hand, there are physical resources that, in broad terms, are in fixed supply. This includes arable land for agriculture, mineral resources and water resources. An increase in population spreads these fixed resources more thinly, leading to lower living standards.

It can also be argued that the size of Australia relative to the world economy may matter. For example, in MONASH and MM2, if the Australian economy expands as a share of the world economy, our terms-of-trade falls, as Australian exporters accept lower prices to enable them to increase their share of world markets. However, given the widely-accepted assumption that Australia is a "small" economy within the world economy, this terms-of-trade effect would be expected to be small.

In summary, migration can be expected to affect living standards in the following ways:

1) relative human wealth of migrants;
2) relative financial wealth of migrants;
3) economies of scale in networks;
4) diseconomies of scale from fixed natural resources; and
5) relative size of Australia in the world economy (terms-of-trade effect).

Further, the economic attributes of migrants affect the economy through two separate channels – the population growth effect and the population level effect. The former effect is more closely related to the financial wealth of migrants, while the latter effect is more closely related to their human wealth. However, both effects are influenced by both the human and financial wealth of migrants.

Traditionally, the main focus of research on the economic effects of migration and, more generally, demographic developments, has been on the first effect listed above i.e. the effects on the supply of labour or human wealth. This emphasis is evident in the PCPP.

The Econtech modelling system, in use since 1991, also places primary emphasis on these labour supply effects. However, it also takes into account the second effect, operating through migrant financial transfers, and the fifth effect, operating through the terms-of-trade.[9] It makes no allowance for the third and fourth effects, from economies and diseconomies of scale in production, although in net terms these two effects may be relatively minor and in any case operate in opposite directions.

More recent research focuses on the effects of demographic developments on saving and investment. For example, research by the IMF (Brooks, 2003) models the effects of demographic developments on saving, investment and the current account (i.e. the gap between saving and investment). It finds that demographic developments are the key driver

[9] The PCPP modelling system also takes into account the fifth effect, operating through the terms-of-trade, but does not take into account the second effect, operating through migrant financial transfers.

explaining differences in current account balances across generations and countries. Perhaps this important more recent perspective will figure more prominently in future analysis by the Productivity Commission.

To tackle these savings and investment issues, economic models need to better represent the linkages from demographic developments to saving behaviour. MM2 is more developed than MONASH in this area, explicitly modelling:

- migrant financial transfers;
- the impact of asset accumulation on private saving behaviour; and
- the effects of the age structure of the population on government welfare payments.

The recent literature stresses the importance of the age structure of the population for the saving behaviour of both the private and public sectors.

The effects of population ageing on private saving are usually captured using an overlapping generations model of saving, as in Brooks (2003). This approach is yet to make its way into large-scale economy-wide models of Australia, although Econtech is developing a long-term economic model of Singapore that does feature an overlapping generations model of saving.

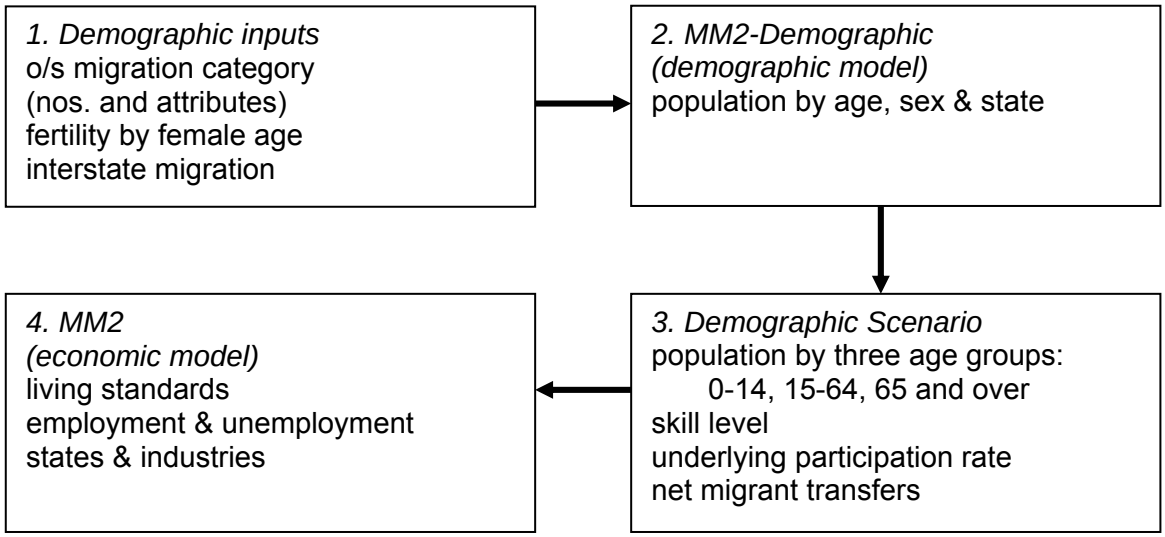
The effects of population ageing on public saving operate primarily through the pressures of ageing on the health system and the welfare system. These effects on public saving have been modeled by the Treasury (2002), Econtech (2004b) in its Government Health Costs model and the Productivity Commission (2005a).

The PCPP concentrated on the traditional, but still important area, of labour supply effects but did not really extend our existing knowledge on the effects of migration on saving and investment – an underdeveloped area in Australian research.

3 Econtech's Migration Modelling Framework

Econtech's Migration Modelling Framework uses Econtech's linked demographic (MM2-Demographic) and economic models (MM2) of Australia. This process involves four steps, as shown in Figure 1.

Figure 1: Modelling Framework



Step One

In step one, the demographic inputs are set to reflect the features of the Migration Program that is being modelled. This involves specifying the following information:

- the expected annual number of permanent arrivals under the migration intake;
- the expected annual number of permanent arrivals under each of the migrant categories;
- fertility rates by female age group; and
- interstate migration.

To fully capture net overseas migration to Australia, estimates are also made of the expected annual numbers of long-term arrivals, permanent departures (both Australian born and overseas born i.e. re-migration) and long-term departures.

Step Two

In step two, the demographic inputs estimated in step one are fed into MM2-Demographic, which uses these demographic inputs to generate a detailed projection of Australia's population out to the year 2064-65. These projections are produced using the cohort-component method, which is also used by the Australian Bureau of Statistics (ABS) to generate its population projections. The model generates year-by-year population projections that are cross-classified by sex, single year of age and state and territory. These population projections form the basis of step three.

Step Three

In step three, the population projections generated in step two are used to construct a demographic scenario. This demographic scenario is to be used in the linked economic model and is important because it is the vehicle through which the attributes of the migration intake have economic impacts in the Migration Modelling Framework. The four elements of the demographic scenario are as follows.

- The first element involves aggregating the single year of age population projections into three broad age groups. This is used in the economic model to identify the population of working-age (aged 15 and over), as well as the population bases for family benefits (aged under 15) and aged pensions (aged 65 and over). The differences between the attributes of migrants and the attributes of the existing population underlie the economic impacts of migration.
- The second element is the skill level of the workforce. Migration changes the average skill level of the workforce by changing the mix of occupations. For example, the skill level of the workforce in Australia rises if higher-skilled and higher-paid occupations account for a larger proportion of the migration intake than of the existing resident population. The second Longitudinal Survey of Immigrants to Australia (LSIA2) provides information on the actual occupations of migrants about 18 months after their arrival in Australia.
- The third element is the underlying labour force participation rate. This is calculated taking into account two factors. The first is the historical trends in labour force participation rates for different age groups of both males and females. The second is the changes in the age-gender composition of the population.
- The fourth element is the financial wealth that migrants bring to Australia as part of overseas migration. This is calculated as funds brought to Australia by permanent arrivals, and the average transfers of different categories of migrants are estimated using LSIA2.

Step Four

In the fourth and final step, the demographic scenario that incorporates the effects of the migration intake is fed into MM2, which is an economic model of the Australian economy. MM2 then provides estimates of the economic impacts of the migration intake such as the impact on GDP, living standards, employment, unemployment as well as at the industry level. An ancillary states model known as MM2-States uses results from MM2, together with the population projections for each state and territory, to estimate economic impacts at the state and territory level.

By the end of this four-step procedure, estimates are produced of the economic effects of the migration intake. This process captures some important ways in which the migrant intake affects the Australian and state and territory economies. In terms of the discussion in Section 2, it captures the following:

- relative human wealth effect: the gain in GDP per capita and consumption per capita (living standards) brought about by skilled migrants having higher labour force participation rates and higher skill levels than existing residents;

- relative financial wealth effect: the loss in living standards (consumption but not GDP) brought about by skilled migrants having lower average wealth levels than existing residents; and
- relative size of Australia in the world economy: the loss in living standards from reductions in the terms-of-trade as Australia's share of the world economy follows a higher trend trajectory.

For documentation of the MM/MM2 model, see Powell and Murphy (1997).

This Migration Modelling Framework is now compared with the interface between the Productivity Commission's demographic/labour supply models and the MONASH Model.

4 Comparison of Modelling Inputs

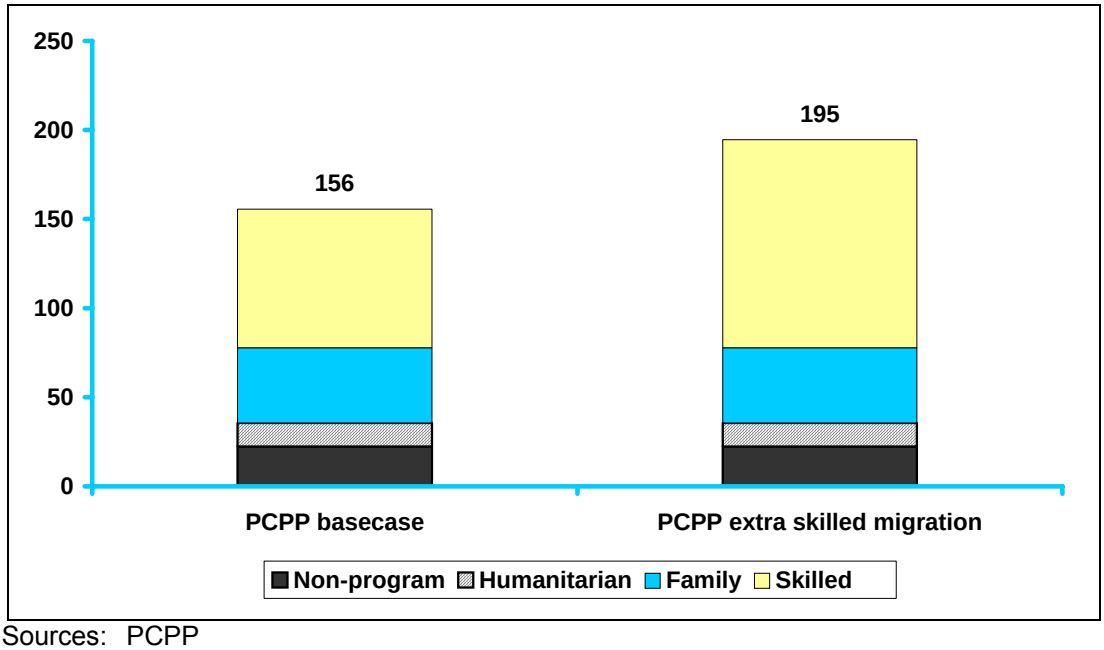
This section compares how increased skilled migration is reflected in the inputs fed into the two economic models. The aim of this comparison is to identify differences in demographic inputs that help to explain the differences in modelling results that will be seen in Section 5. Population inputs are considered first followed by inputs that relate to the economic attributes of migrants.

4.1 Population

We begin by presenting Econtech's population inputs. These are then compared with the PCPP population inputs.

Chart 4.1 contains the migration intake assumptions for two scenarios that were simulated in the PCPP. In the "PCPP Basecase Scenario" (shown as the first column in the chart), the 2004/05 Migration and Humanitarian Programs are continued for 20 years, which means that there are a total of about 156,000 permanent arrivals each year from this year onwards. Of these, 133,250 places are permanent arrivals under the migration intake (including 77,880 places for skilled migrants) while the remaining 22,380 places are non-program arrivals, which consist primarily of New Zealanders who have automatic right of entry.[10]

Chart 4.1
Modelled Permanent Arrivals for 2005/06 Onwards



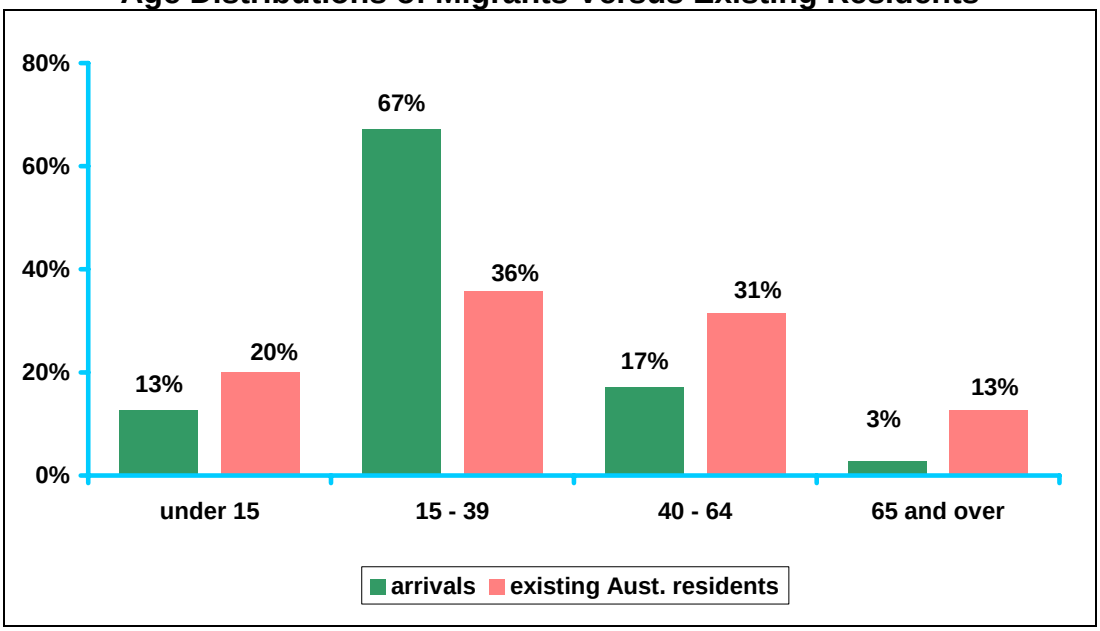
Sources: PCPP

In the "PCPP Extra Skilled Migration Scenario" (shown as the second column in the chart), there is a 50 per cent increase in the level of skilled migration. This increase, which is equivalent to an extra 38,940 skilled migrants per year, takes the total annual number of skilled places to 116,820 and the total annual number of permanent arrivals to about 195,000 from 2005/06 onwards.[11]

[10] The economic effects of non-program migration are not considered in either the PCPP or this report.
[11] In the PCPP modelling, only half of increase in the number of skilled places (about 19,470) is filled in 2004/05 but there are 38,940 extra skilled migrants from 2005/06 onwards.

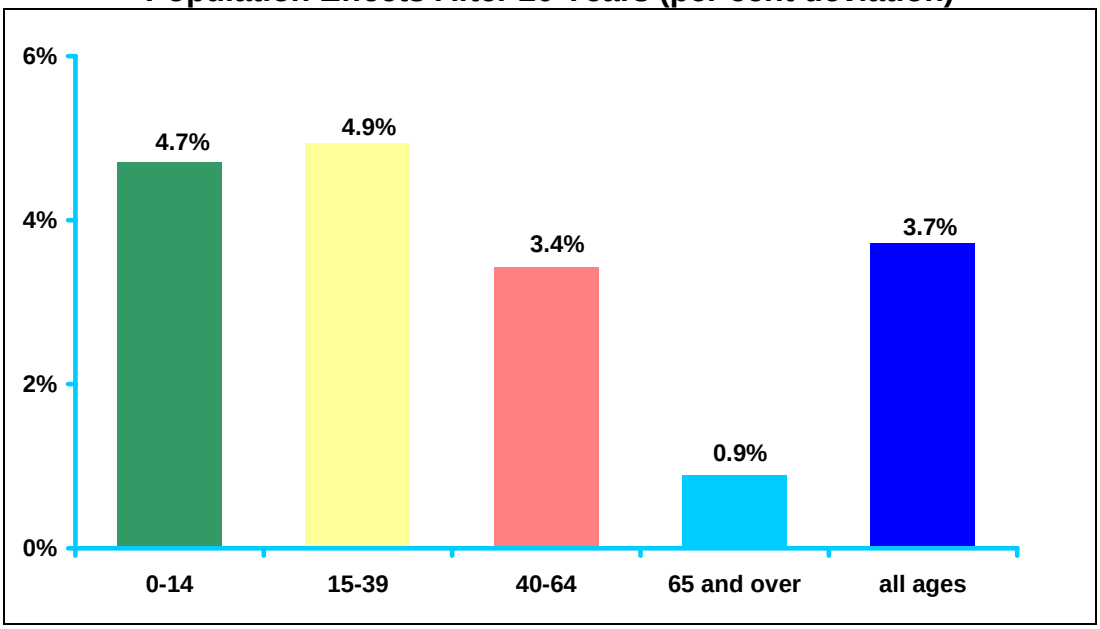
This increase in the size of the migrant intake means that, after 20 years, Australia's population is 3.7 per cent higher than otherwise would be the case. The age structure of the population is also affected because the age distribution of migrants differences from the age distribution of existing residents. These two age distributions are compared in Chart 4.2. It shows that, relative to the existing population, the 15-39 age group is over-represented in the migrant intake while other age groups are under-represented.

Chart 4.2
Age Distributions of Migrants Versus Existing Residents



Sources: ABS

Chart 4.3
Population Effects After 20 Years (per cent deviation)



Sources: Migration Modelling Framework
Note: "Long-term" refers to the ongoing gains from continuing the extra skilled migration intake for a further 20 years.

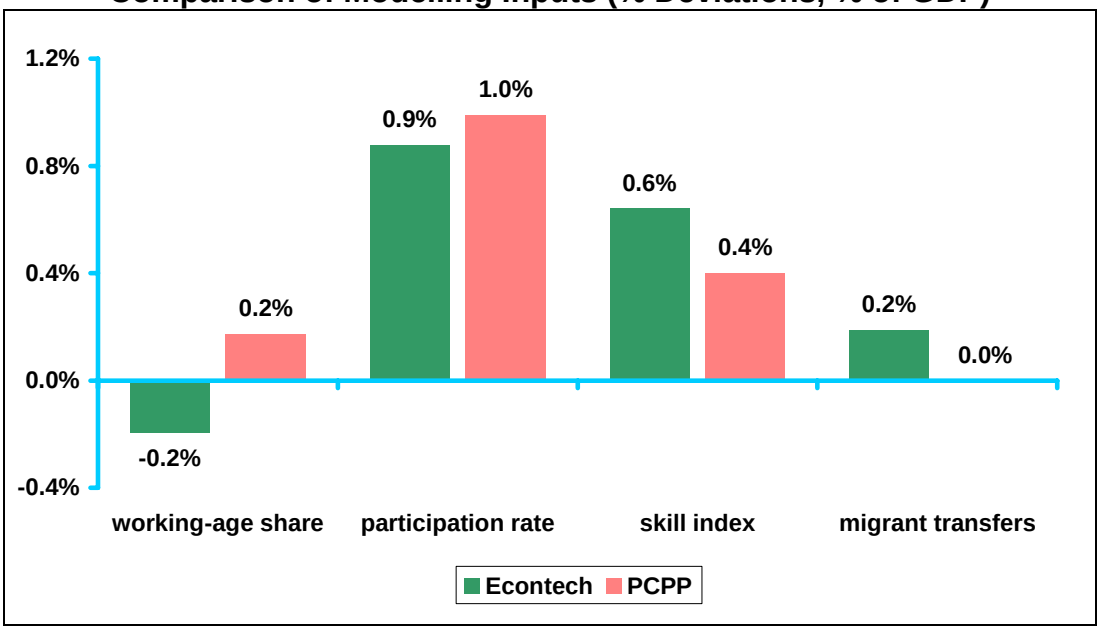
Chart 4.3 shows that these differences in age distributions mean that, while the extra skilled migration intake is projected to add 3.7 per cent to Australia's population after 20 years, the percentage population boost varies between age groups. The chart shows the percentage population boost is the largest at 4.9 per cent for the prime working-age group (aged 15-39). This boost exceeds the percentage rise in the total population of 3.7 per cent, which is to be expected given that a high proportion of the intake consists of migrants aged between 15 and 39 years of age. Conversely, extra skilled migration adds only 0.9 per cent to the retirement age group.

While Econtech estimates a population gain after 20 years of 3.7 per cent from extra skilled migration, the PCPP estimates a population gain of only 2.7 per cent. The main reason for this large difference is that the PCPP does not take into account the extra births from extra skilled migrants. Over the 20 years, Econtech's demographic modelling shows 163,000 extra births resulting from the extra skilled migrants. If the PCPP estimates were corrected to allow for these extra births, they would show a corrected population gain of 3.4 per cent, rather than the reported population gain of 2.7 per cent. Allowing for migrant births would also significantly change the PCPP estimates for the effects of extra skilled migration on the age distribution of the population.

4.2 Migrant Economic Attributes

Besides having a different age distribution from the existing population, migrants also have significantly different economic attributes. Chart 4.4 compares the inputs to the economic modelling that are used to capture the economic attributes of the extra skilled migrants.

Chart 4.4
Comparison of Modelling Inputs (% Deviations, % of GDP)



Sources: Migration Modelling Framework, PCPP Modelling Framework
Notes: The estimates for the working-age share, participation rate and skill index are expressed as percentage deviations while the estimates of migrant transfers are expressed as a percentage share of GDP.

These inputs reflect the human wealth and financial wealth of the extra migrants as captured in the following indicators:

- the working-age share of the population;
- labour force participation rate;
- skill index for workforce; and
- migrant transfers.

Each of the fours inputs are discussed (and compared) in turn below.

Working-Age Share of the Population

The first input is the working-age share (15 years and over) of the population. Chart 4.4 shows a marked difference in the estimates from the two modelling frameworks for the impact of extra skilled migration on the working-age share of the population for the two modelling frameworks. Econtech finds a fall in this share of 0.2 per cent, while the PCPP finds a rise of 0.2 per cent. This difference is accounted for by the fact highlighted above that the PCPP fails to account for the births from extra skilled migrants.

The PCPP estimate of an increase in the working age share reflects the fact that children are under-represented in the migration intake, as already seen in Chart 4.2. Econtech's modelling allows for this effect. However, unlike the PCPP modelling, Econtech's modelling also allows for births to the extra migrants. It shows that while the working-age share of the population is higher initially because children are under-represented in the migrant intake, after 20 years this share is higher by 0.2 per cent because of births to migrants. Migrants have a high crude birth rate because the fertile age group of 15-39 is greatly over-represented in the migrant intake, as seen in Chart 4.2.

The omission of migrant births from the PCPP modelling is a significant factor in understanding the differences in results between the two modelling frameworks.

Labour Force Participation

The second input is the labour force participation rate.

In MM2, the underlying labour force participation rate is calculated taking into account two factors. The first is the historical trends in labour force participation rates for different age groups of both males and females. Migration is not assumed to affect these trends. The second is the changes in the age-gender composition of the population. As seen in Chart 4.3, extra skilled migration provides its highest percentage boost of 4.9 per cent to the highest participation rate age group of 15-39, well in excess of the percentage boost to the total working-age population of 3.5 per cent. According, extra skilled migration provides a mounting boost to the labour force participation rate, as seen in Chart 4.5.

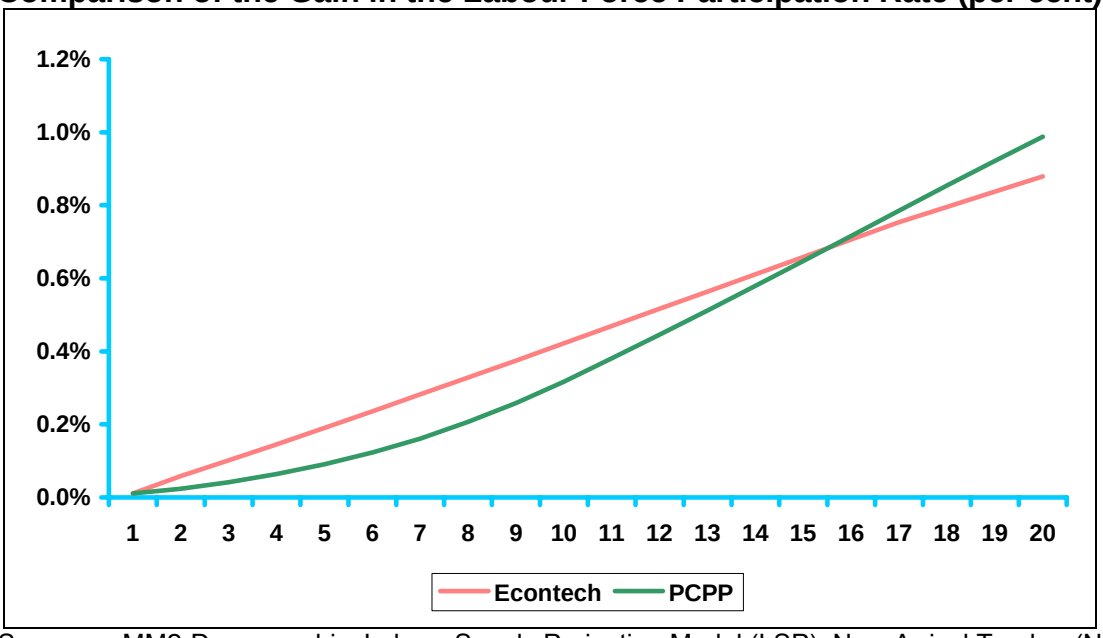
Chart 4.5 shows that gains in the labour force participation rate in the two modelling frameworks follow different time paths but reach similar endpoints. The similar endpoints are reflected in Chart 4.4, which shows long-term gains in participation rates of 0.9 per cent for Econtech and 1.0 per cent for the PCPP.

The PCPP estimates are based on participation rates of migrants in the years after they settle in Australia. As noted above, Econtech's estimates are based on the effects of the extra migrants on the age-gender composition of the population. That the long-term estimates are

similar confirms that skilled migration lifts participation rates and that this is due to its impact on the age-gender composition of the population. Put another way, the similarity in long-term results between the two modelling frameworks reflects the fact that labour market behaviour, including age-gender specific labour force participation rates, are similar between well-established migrants and existing residents.

However, Chart 4.5 also shows that the labour force participation rate is slower to respond to extra skilled migration in the PCPP modelling than in the Econtech modelling. This is because the PCPP Modelling Framework factors in an acclimatisation path for the extra skilled migrants. For example, for the first 10 years, the extra skilled migrants have lower labour force participation and higher unemployment than Australian residents of the same age and gender.

Chart 4.5
Comparison of the Gain in the Labour Force Participation Rate (per cent)



Sources: MM2-Demographic, Labour Supply Projection Model (LSP), New Arrival Tracker (NAT)

This PCPP modelling approach infers overall labour market outcomes from the labour market experiences of migrants in the years after they settle. It therefore assumes that the presence in the labour market of the extra skilled migrants has no impact on labour market outcomes for existing residents. This assumption can be questioned.

In particular, while weaker labour market outcomes for newly-arrived migrants reflect the fact that they have a temporary disadvantage in the labour market, this may advantage existing residents. Migration boosts labour demand (according to both the PCPP and Econtech), but existing residents may receive a greater benefit from this because employers rate them more highly than newly-arrived migrants. This view is reflected in Econtech's approach, which models overall labour market outcomes on the basis of total labour demand and supply. Under this approach, if migrants are faring relatively poorly during their acclimatisation period, existing residents will be faring relatively well.

In any case, as already noted, the end result after 20 years is a similar percentage increase in the labour force participation rate for both the Migration Modelling Framework and the PCPP Modelling Framework. This means that the long-term gain in the labour force

participation rate is not a significant contributing factor to the differences in results from the two modelling frameworks.

Skill Premiums of Migrants

The third input is the gain in skill level of the workforce after 20 years from extra skilled migration. Econtech puts this gain at 0.6 per cent compared with 0.4 per cent in the PCPP modelling. The two modelling frameworks take skills into account in different ways, but these ways are equivalent for the purpose of determining the effects of extra skilled migration on economy-wide aggregates, such as living standards.

In the Migration Modelling Framework, the skill premium of skilled migrants is estimated by comparing their occupational mix with that of existing residents. LSIA2 is used to estimate the occupational mix of migrants. The skill level of each occupation is valued by its average wage. Labour input to production is then measured as total employment adjusted for skill level.

The PCPP Modelling Framework uses the educational attainment mix of migrants and existing residents. Educational attainments are then converted to occupations. Each occupation is then used as a separate labour input into production.

While these two approaches may look different, they are equivalent for the purpose of determining the effects of extra skilled migration on employment in efficiency units and therefore on economy-wide outcomes. The standard proof of this is given in Box 4.1, which shows the same result for the change in aggregate employment in efficiency units, irrespective of whether a skill index or multi-labour input production function is used. (This proof can be extended to include the extra step in the case of the PCPP modelling of starting with educational attainments.)

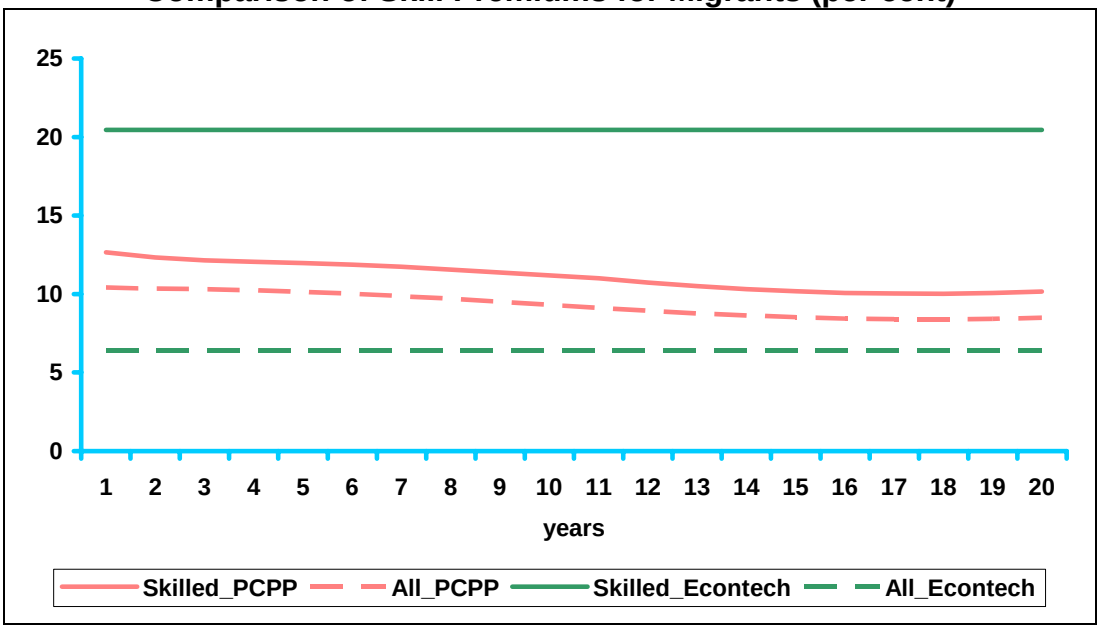
Box 4.1
Equivalence of Skill Index With Multi-Labour Input Production Function

Multi-labour Inputs:	Skill Index Approach:
$y = f(K,N)$	$y = f(K,N)$
$N = g(n_1,n_2,\ldots,n_m)$	$N = \sum([w_i/w]*n_i)$
$dN = \sum \delta g/\delta n_i * dn_i$	$dN = \sum([w_i/w]*dn_i)$
$w_i = [\delta f/\delta N]*[\delta g/\delta n_i]$	
$w = [\delta f/\delta N]$	
$dN = \sum([w_i/w]*dn_i)$	

The estimates of the skill premiums for skilled migrants for both modelling frameworks are shown in Chart 4.6. The PCPP skill indexes have been calculated by Econtech by applying appropriate wage rates to the educational attainment mixes used in the PCPP.

Chart 4.6 shows that there is a significant difference between the two modelling frameworks in terms of the skill premium of skilled migrants compared with the skill premium of all migrants.

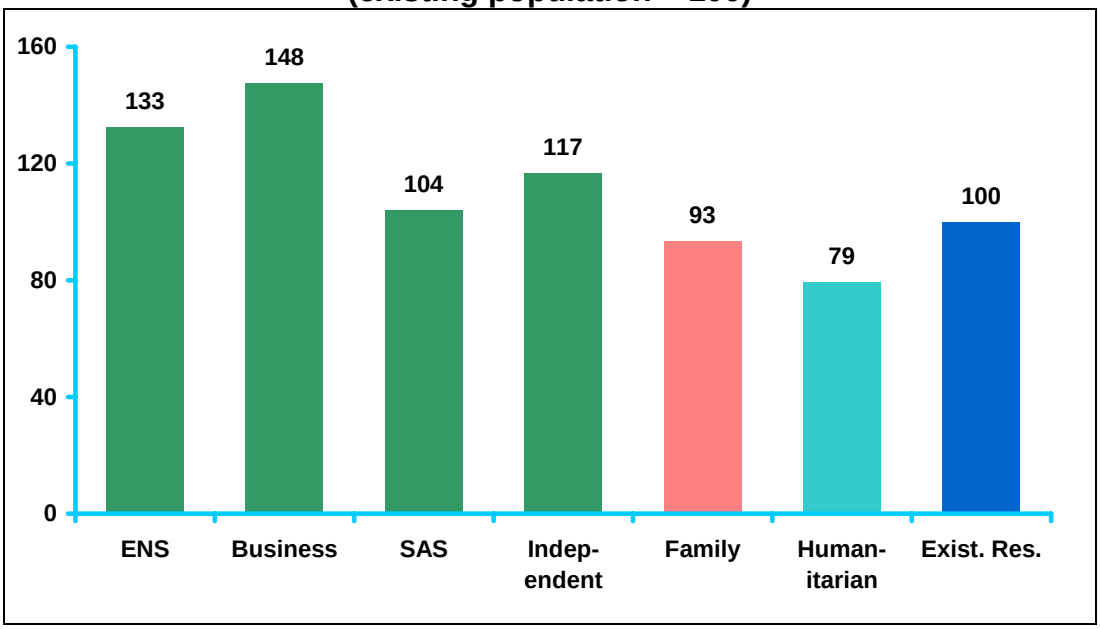
Chart 4.6
Comparison of Skill Premiums for Migrants (per cent)



Sources: Migration Modelling Framework, PCPP Modelling Framework

Econtech's results show a difference between the skill premium for skilled migrants and all migrants of about 14 percentage points (20 per cent skill premium versus 6 per cent skill premium), compared with a difference of only about 2 percentage points under the PCPP Modelling Framework. The latter small difference reflects the fact that, according to the PCPP modelling, the educational attainment mix for skilled migrants is only marginally superior to that of all migrants. Econtech's higher premium is consistent with the evidence shown in Chart 4.7 and discussed in more detail below.

Chart 4.7
Econtech's Migration Modelling Framework Skill Indexes
(existing population = 100)



Sources: Migration Modelling Framework

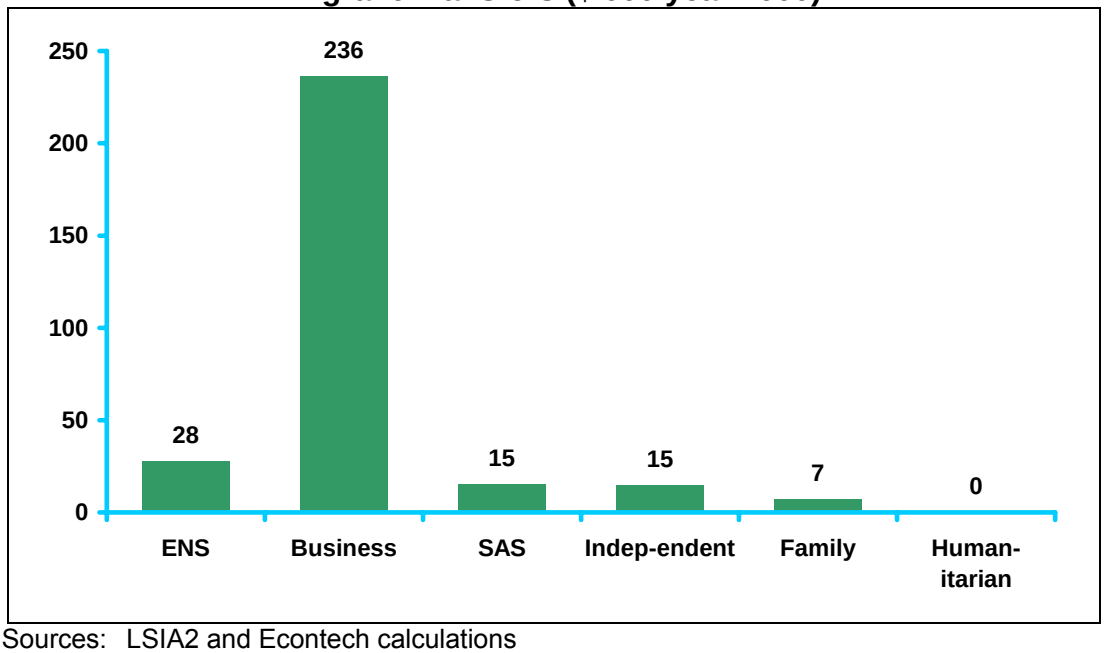
Econtech's Migration Modelling Framework estimates skill indexes for seven different categories – six migrant categories plus existing residents – based on their occupational mix as shown by LISA2. Chart 4.7 shows that the skill indexes for the four categories of skilled migration are as follows: Business Skills (148), Employer Nominated Scheme (133), Independent (117) and Skilled-Australian Sponsored (104). By comparison, the skill indexes for other categories of migration are as follows: Family (93) and Humanitarian (79).

Econtech's result of a 14 percentage point gap between the skill levels of skilled migrants and other migrants is explained by the wide differences in skill indexes between skilled migrants and other migrants shown in Chart 4.7. This makes the PCPP implied result of a gap of only 2 percentage points highly implausible and strongly indicates a problem in the calculation of educational attainment mixes for migrants in the PCPP modelling. This provides a plausible explanation for the PCPP finding shown in Chart 4.4 that extra skilled migration adds only 0.4 per cent to the skill level of the workforce after 20 years compared with the more-clearly substantiated Econtech estimate of 0.6 per cent.

Migrant Transfers

The final difference in the inputs is the treatment of migrant transfers. LISA2 provides the following information on migrant transfers of funds up to 18 months after arrival for the various migration categories. These funds of migrants should be compared with the average financial wealth of existing residents. This shows that business migrants are wealthier on average than existing residents but all other categories of migrants are less wealthy. As a group, skilled migrants are less wealthy than existing residents, because the high fund transfers of business migrants are not sufficient to outweigh the low fund transfers of the other three categories of skilled migrants.

Chart 4.8
Migrant Transfers ($'000 year 2000)



Sources: LSIA2 and Econtech calculations

This means that the average skilled migrant does not bring sufficient funds to fully finance his or her investment demands. It was shown in Section 2 that this would detract from annual living standards.

In contrast, migrant transfers are not modelled in the PCPP. Specifically, as stated in the footnote on page 289 of the PCPP:

> "Although some immigrants bring capital with them, this is very small relative to the stock of capital held by the Australian-born population and the existing net foreign liabilities. As a result, although this is accounted for in the simulations, it is not modeled explicitly."

The comparison made in this quote from the PCPP between the fund transfers of migrants and the stock of capital and foreign liabilities is misplaced. As shown in Section 2, the appropriate comparison for assessing the affect of migration on living standards is between the average wealth (or fund transfers) of migrants and the average wealth of existing residents, not their total wealth. While the quote from the PCPP suggests that migrant transfers are somehow implicitly accounted for in the PCPP modelling, the BOTE model presented in the PCPP does not recognise migrant transfers in its balance of payments equation.

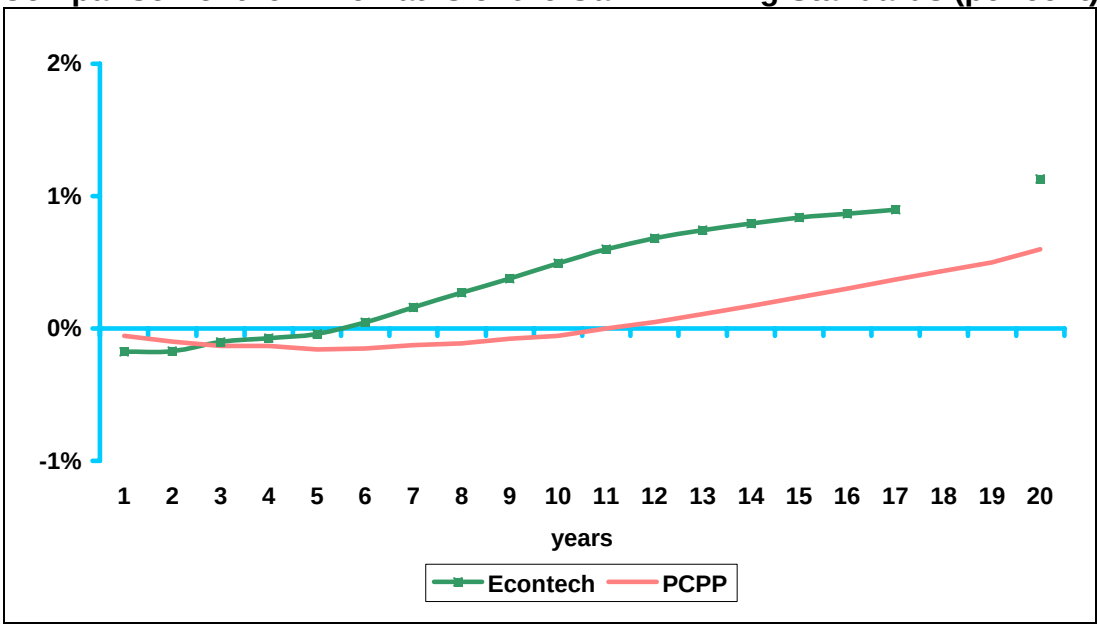
Thus, the Econtech modelling takes into account that skilled migrant categories are able to partially finance the extra investment in business capital and housing created by their migration, while the PCPP modelling apparently assumes that they make no contribution. This failure to account for migrant transfers builds into the PCPP modelling an assumed detraction from living standards from extra skilled migration. As will be seen in Section 5, not modelling migrant transfers in the PCPP modelling is a contributing factor to the differences in results between the two modelling frameworks.

5 Comparison of Modelling Results

As discussed in the Introduction, while extra skilled migration will expand the population and the economy, the issue is whether this is accompanied by higher living standards. This depends on whether the percentage expansion in consumption exceeds the percentage expansion in population, implying a gain in living standards as measured by consumption per head.

According to the PCPP, living standards are lower than would otherwise be the case for the first 12 years of the policy, but are then higher, as shown in Chart 5.1. After 20 years, the gain in living standards reaches 0.6 per cent. Econtech's modelling shows that the initial drop in living standards is more mild and less protracted, and after 20 years the gain in living standards reaches 1.1 per cent, compared with the PCPP estimate of 0.6 per cent.[12] This is a material difference for assessing the economic merits of the skilled migration program.

Chart 5.1
Comparison of the Time Paths of the Gain in Living Standards (per cent)



Sources: Migration Modelling Framework, PCPP Modelling Framework
Notes: The PCPP uses real GNP per capita as the estimate of living standards while Econtech uses real consumption per capita as the estimate of living standards.

5.1 Annual Living Standards

As just noted, living standards can be measured by consumption per head. This can be decomposed into four components or channels using the following accounting identity.

[12] The PCPP uses real GNP per capita as the estimate of living standards while Econtech uses real consumption per capita. For the purposes of comparison, the results under both estimates have been expressed in percentage terms.

Consumption / total population

= consumption / GDP ("consumption share")

X GDP / employment ("labour productivity")

X employment / working-age population ("employment rate")

X working-age / total population ("working-age share")

One reason this decomposition is useful is that the individual components or channels can be related to the modelling inputs discussed in Section 4. Thus, the decomposition provides a means of understanding how differences in the modelling inputs lead to differences in the estimates of gains in living standards. The modelling inputs from Section 4 were:

1. the working-age share of the population;
2. labour force participation rate;
3. skill index for labour force; and
4. migrant transfers.

The links from each of these four inputs to the four components of the gain in living standards are now explained in turn.

The working-age share of the population appears both as a model input and as one component in the change in living standards. To the extent that migration lowers the working-age share of the population (because of births to migrants), it will lower consumption per head. This will lower living standards.

Higher skilled migration raises the labour force participation rate. This in turn raises the employment rate, which is a component in the change in living standards. The employment rate is also raised by any reduction in the unemployment rate. A higher employment rate will raise consumption per head.

Higher skilled migration also raises the skill index for the labour force. This should raise labour productivity, which is a component in the change in living standards. In turn, higher labour productivity will raise consumption per head.

Finally, skilled migration is associated with migrant transfers. However, in practice, skilled migrants are less wealthy on average than existing residents. This means that the consumption share of GDP, which is a component in the change in living standards, must fall to help finance the investment needs of extra migrants. A fall in the consumption share of GDP will lower consumption per head.

Chart 5.2 shows the result already seen in Chart 5.1 that, after 20 years, the extra skilled migration raises living standards by 1.1 per cent according to Econtech and 0.6 per cent according to the PCPP. It also shows how these differences arise from the four channels to living standards discussed above.[13]

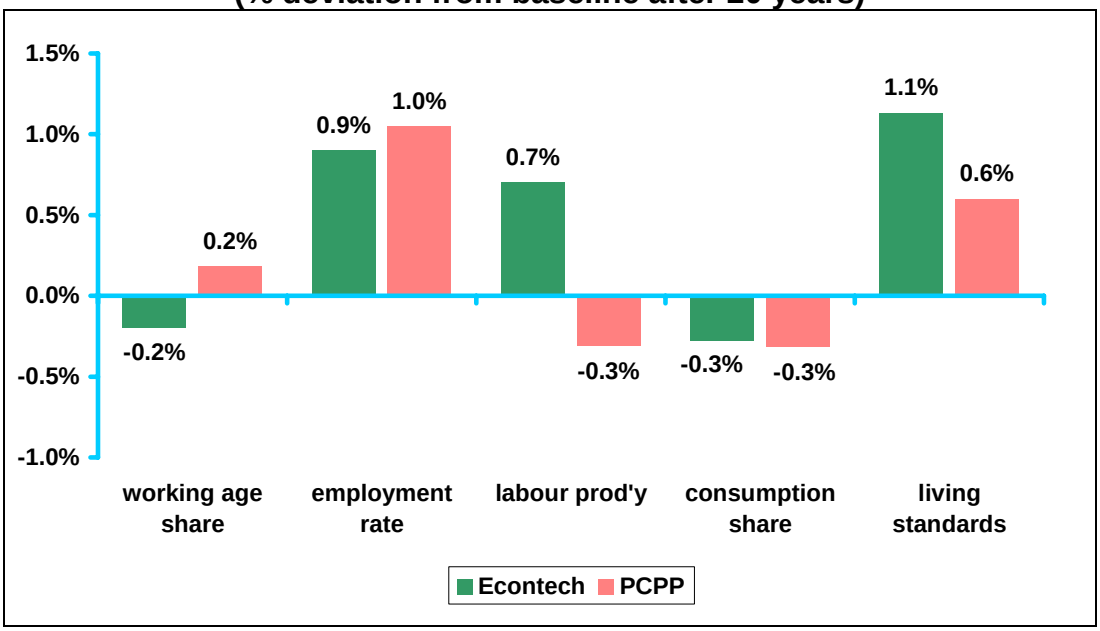
In broad terms, the chart shows that the PCPP estimates a lower gain in living standards than Econtech because of a lower impact on labour productivity partly offset by a higher impact

[13] In both modelling frameworks, no allowance is made for the impact on living standards from economies and diseconomies of scale in production, although in net terms these two opposing effects may be relatively minor.

on the working-age share of the population. The estimates for the affects of extra skilled migration on the other two components of living standards – the employment rate and the consumption share of GDP – are similar.

These results are now discussed in more detail taking each channel in turn.

Chart 5.2
Comparison of the Components of the Change in Living Standards
(% deviation from baseline after 20 years)



Sources: Migration Modelling Framework, PCPP Modelling Framework
Notes: The PCPP uses real GNP per capita as the estimate of living standards while Econtech uses real consumption per capita as the estimate of living standards.

Working-Age Share of the Population

The first channel is the working-age share (15 years and over) of the population. This channel has already featured as a model input in Section 4. Briefly, Econtech finds a fall in this share of 0.2 per cent, while the PCPP finds a rise of 0.2 per cent, a difference of 0.4 percentage points. This difference is accounted for by the fact highlighted in Section 4 that the PCPP fails to account for the births to the extra skilled migrants.

If PCPP modelling were corrected to allow for the births to the extra skilled migrants, its estimate of the gain in living standards after 20 years would fall by 0.4 percentage points.

Employment Rate

Turning to the second channel, the employment rate, Chart 5.2 shows that there are similar gains in living standards through this channel for both modelling frameworks. Specifically, after 20 years, this channel contributes 0.9 per cent according to Econtech and 1.0 per cent according to the PCPP.

In both cases, the boost to the employment rate is due to a higher labour force participation rate. As explained in Section 4, the gain in the labour force participation rate is because extra skilled migration provides its highest percentage boost of 4.9 per cent to the highest

participation rate age group of 15-39, well in excess of the percentage boost to the total working-age population of 3.5 per cent.

The employment rate is also influenced by the unemployment rate. However, both sets of modelling results show no significant effect on unemployment after 20 years.

Both sets of modelling results agree that extra skilled migration provides a substantial boost to the employment rate of 0.9 or 1.0 per cent after 20 years.

Labour Productivity

The third channel is labour productivity, which provides the largest difference between the two estimates of the impact of the extra skilled migration intake on annual living standards. As seen in Chart 5.2, under the PCPP Modelling Framework, the extra skilled migration intake leads to a fall in labour productivity of about 0.3 per cent while under Econtech's Migration Modelling Framework, the extra skilled migration intake stimulates a rise in labour productivity of about 0.7 per cent. Thus, in the PCPP modelling, the labour productivity effect detracts 1.0 per cent from the gain in living standards compared with the Econtech modelling.

The Econtech result is simple to explain. As seen in Chart 4.4, extra skilled migration adds 0.6 per cent to the labour force skill index. This increase in the efficiency of the labour force of 0.6 per cent leads to a similar increase in labour productivity of 0.7 per cent.

By comparison, the PCPP modelling is based on a lower increase in labour force skill of 0.4 per cent. As explained in Section 4, the smaller increase in labour force skill reflects the fact that, according to the PCPP modelling, the educational attainment mix for skilled migrants is only marginally superior to that of all migrants, which is highly implausible. This problem probably accounts for the fact that extra skilled migration adds only 0.4 per cent to the skill level of the workforce in the PCPP modelling compared with the Econtech estimate of 0.6 per cent.

Even so, this smaller gain in skill in the PCPP modelling is not sufficient to explain the big difference in labour productivity effects from the Econtech modelling. The PCPP modelling is 0.2 per cent lower for the skill index but 1.0 per cent lower for labour productivity.

Put another way, the PCPP modelling implies a gain in labour skill of 0.4 per cent yet labour productivity falls by 0.3 per cent. This runs counter to expectations from standard models such as those presented in Box 2.1, which imply that labour productivity should rise with labour skills. The PCPP reports this fall in labour productivity as follows (PCPP, p. 92):

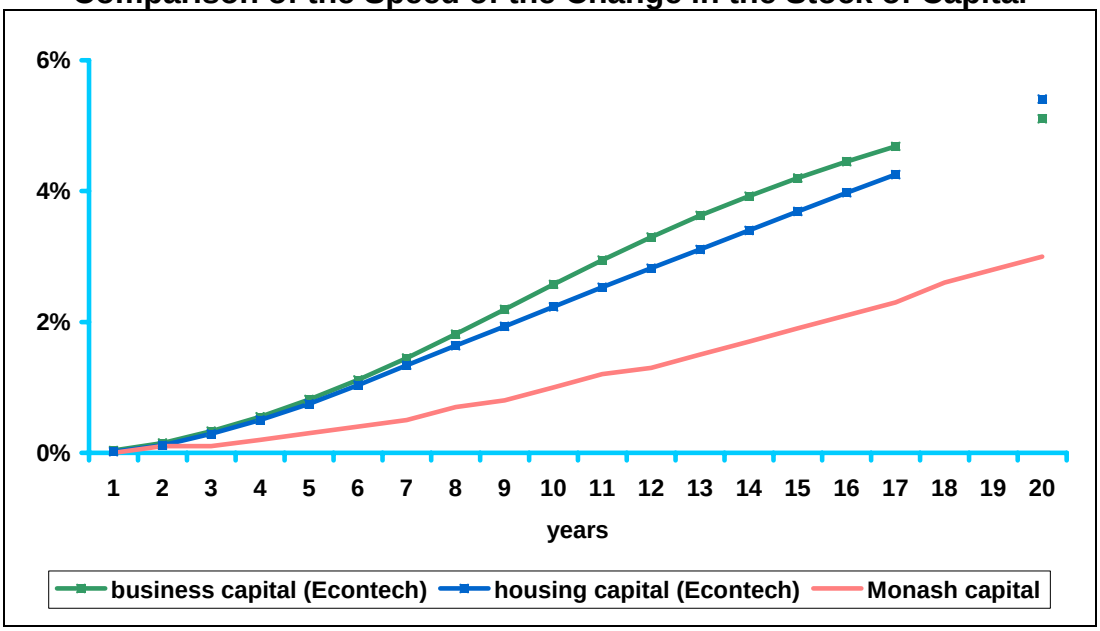
> *"The results of the Commission's policy simulation suggest that immigration (and the consequent population increase) will, all other things being equal, lead to a decrease in economywide labour productivity."*

The main reason for this non-standard result in the PCPP modelling is a very slow rate of adjustment of capital to the increase in population caused by the extra skilled migration intake. After 20 years, the capital stock is only just over half way to adjusting to reach its new equilibrium path. This implied sharp fall in the ratio of capital to labour (measured in efficiency units) reduces labour productivity. In contrast, under Econtech's Migration

Modelling Framework, both business and housing capital adjust more quickly so that the economy is near its new equilibrium path after 20 years.

Chart 5.3 compares the adjustment of capital stocks in the two models. The dots on the right of the chart are from the steady equilibrium paths of the capital stocks and represent long run estimates of the change in capital stocks. These estimates were obtained using the long run properties of MM2. The solid lines in the chart are from the actual dynamic paths of the models and show the dynamic path of the change in capital stocks over 17 years for MM2 and over 20 years for Monash. Comparing the solid lines with the dots, it can be seen that the housing and business capital stocks in MM2 are on a trajectory over 17 years that will take them close to the steady equilibrium paths by year 20.

Chart 5.3
Comparison of the Speed of the Change in the Stock of Capital



Sources: Migration Modelling Framework, PCPP Modelling Framework

In contrast, the capital stock for Monash is only just over one half of the way to the equilibrium path. This results in the sharp fall in the ratio of capital to labour measured in efficiency units that was described above, and hence the fall in labour productivity.

The Monash result that, even after 20 years, industry is only able to complete just over one half of the adjustment in capital to a higher skilled migration intake is completely implausible. It is usually suggested that the "long run" is after 5 to 10 years but these PCPP results are still far from the long run after 20 years.

If PCPP modelling were adjusted to allow for a more plausible rate of adjustment of capital to the extra skilled migrants, and if apparent problems in the calculation of the educational attainment mix for skilled migrants were corrected, then the PCPP modelling would show a more positive outcome for labour productivity. In particular, it could be expected to show a gain in labour productivity similar to the Econtech estimate of 0.7 per cent, instead of a fall of 0.3 per cent. This would add 1.0 percentage points to its estimate of the gain in living standards after 20 years.

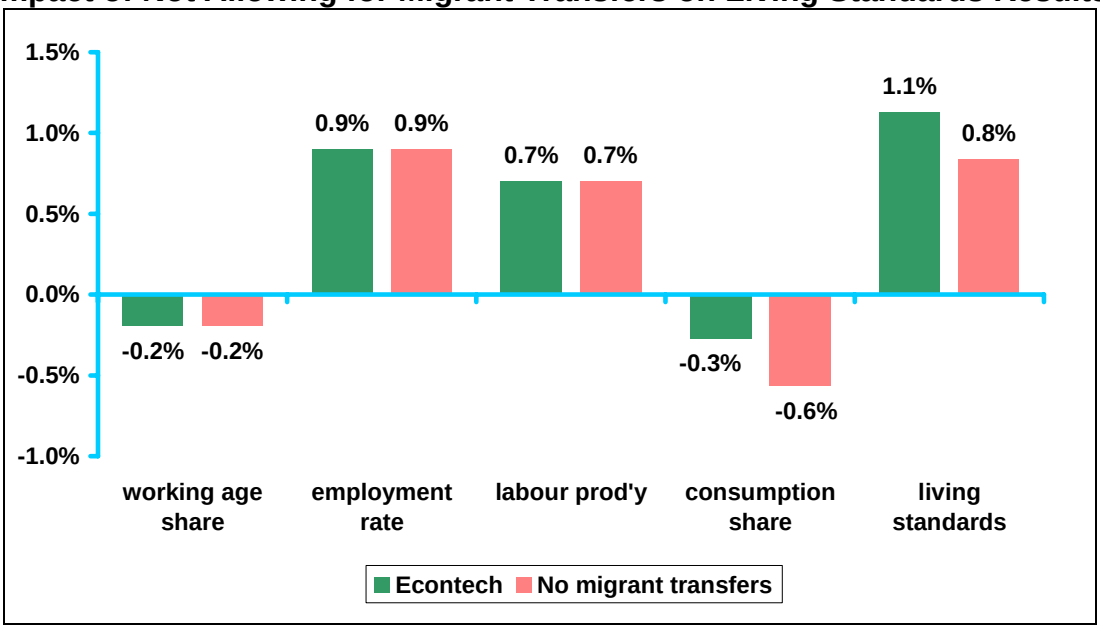
Consumption Share of GDP

Finally, Chart 5.2 shows that there are similar contributions to living standards through the consumption share of GDP channel for both modelling frameworks. In both cases, the consumption share of GDP detracts 0.3 percentage points from the gain in living standards. This similarity disguises offsetting differences in two effects on the consumption share of GDP. These two effects relate to migrant transfers and the terms-of-trade.

Thus, the Econtech modelling takes into account that skilled migrant categories are able to partially finance the extra investment in business capital and housing created by their migration, while the PCPP modelling apparently assumes that they make no contribution at all i.e. have zero net assets.

To show the impact on living standards of not allowing for migrant transfers, Econtech once again conducted the same simulation of an increase in skilled migration of 50 per cent but this time with the migrant transfers of the extra skilled migrants excluded from the simulation. The results of this additional simulation are shown in Chart 5.4. Both sets of results in the chart were simulated using Econtech's Migration Modelling Framework.

Chart 5.4
Impact of Not Allowing for Migrant Transfers on Living Standards Results



Sources: Migration Modelling Framework

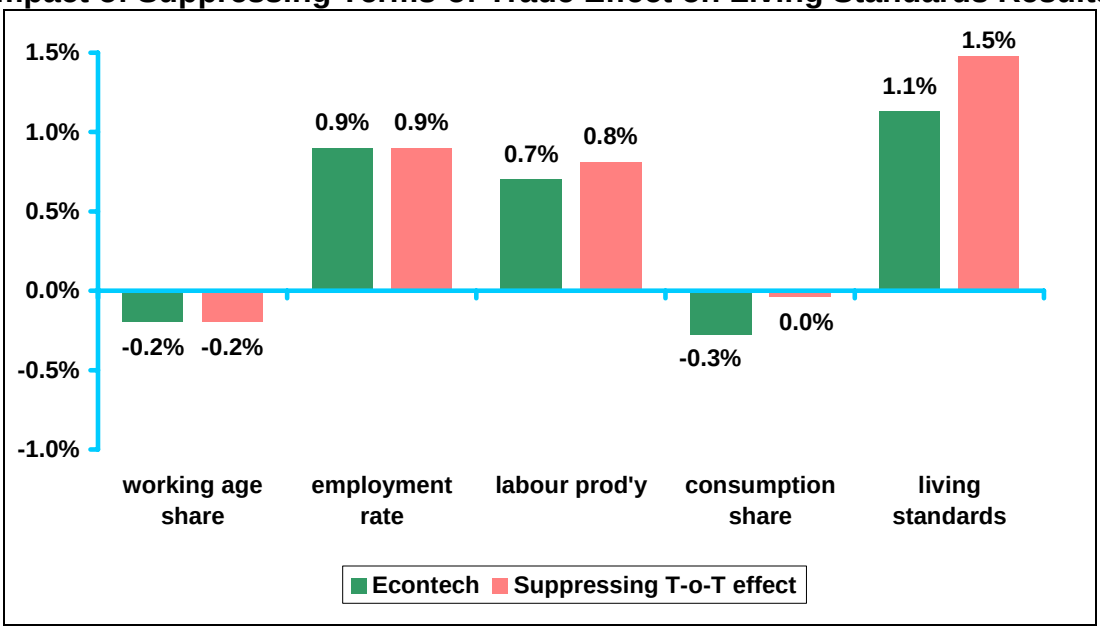
The chart shows that excluding migrant transfers from the analysis further reduces the contribution of the consumption share of GDP channel to annual living standards. Specifically, the chart shows that the contribution to living standards through this channel falls from -0.3 per cent to -0.6 per cent, because additional GDP must be diverted to fully finance (through higher net exports) the expansion in the stocks of business and housing capital caused by the extra skilled migrants.

On the other hand, Econtech estimates that the terms-of-trade falls by about 1.1 per cent while the PCPP estimates the terms-of-trade falls by about 0.6 per cent. This fall in the terms-of-trade occurs because export prices fall as an expanded Australian economy moves

to increase its share of world trade. A lower terms-of-trade means that the same volume of exports can be exchanged for a lower volume of imports, leading to lower living standards.

The significance of the terms-of-trade effect in the Econtech results can be seen by again conducted the standard simulation of an increase in skilled migration of 50 per cent, but this time with the terms-of-trade effect largely suppressed. This is achieved by expanding the world economy in line with gain in the Australian population, largely removing the need for an increase in Australia's share of world trade. The terms-of-trade only falls by 0.2 per cent rather than 1.1 per cent. The resulting simulation results are compared with the standard simulation in Chart 5.5.

Chart 5.5
Impact of Suppressing Terms-of-Trade Effect on Living Standards Results



Sources: Migration Modelling Framework

The chart shows that largely suppressing the fall in the terms-of-trade improves the contribution of the consumption share of GDP channel to annual living standards. Specifically, the chart shows that the contribution to living standards through this channel rises from -0.3 per cent to 0.0 per cent. Avoiding a significant fall in the terms-of-trade, means avoiding a significant fall in the volume of imports that can be exchanged for a given volume of exports.

It can also be seen from Chart 5.5 that largely suppressing the fall in the terms-of-trade also leads to a slight improvement in the labour productivity, raising it from 0.7 per cent to 0.8 per cent. This is because a higher terms-of-trade raises the price of output relative to the price of expenditure (including new investment), improving the rate of return on capital and therefore stimulating the capital-labour ratio, which in turn boosts labour productivity.

For a full explanation of the long-run effects of a change in the terms-of-trade in MM/MM2, see Murphy (1992). He shows how these long-run effects are fully consistent with theory.

Overall, the two models show a similar effect on the consumption share of GDP. This is because Econtech's larger terms-of-trade effect offsets the fact that Econtech also allows for

migrant transfers. Thus, both modelling approaches lead to the same estimate that the consumption share of GDP is reduced by 0.3 per cent.

Both sets of modelling results agree that the consumption share of GDP falls by about 0.3 per cent. Monash omits migrant transfers, but the impact of this on the consumption share of GDP is offset by a smaller terms-of-trade effect.

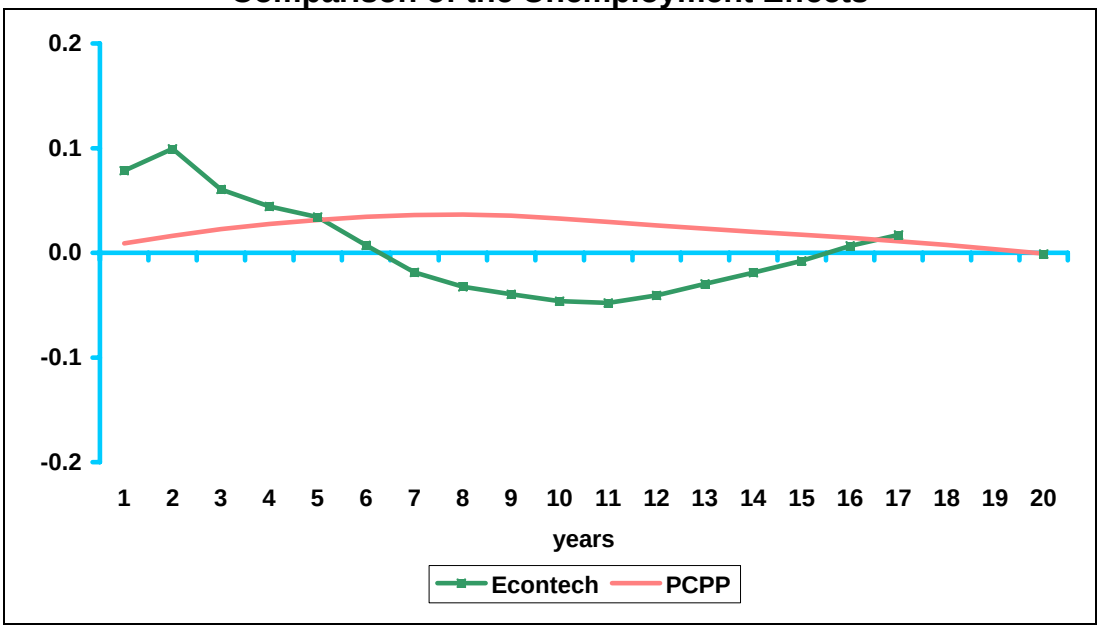
Econtech's MM2 results for all three simulations are summarised in table form in Tables 5.1 and 5.2 at the conclusion of this section. For a more detailed analysis that distinguishes the economic effects of different streams within the skilled migration program and presents more detailed results, see Econtech (2004b).

5.2 Unemployment Effects

Chart 5.5 shows that both modelling frameworks find that the extra skilled migration intake has a minimal impact on the unemployment rate, although for a different reason.

Specifically, for Econtech's Migration Modelling Framework, the minimal impact of the extra skilled migration intake on unemployment is an outcome of the modelling. This outcome is the result of separate modelling and labour demand and supply, and gradual adjustment of wages so that the unemployment rate converges back to the non-accelerating inflation rate of unemployment (NAIRU) in the long-term. This rate is independent of the size or nature of the migration intake.

Chart 5.5
Comparison of the Unemployment Effects



Sources: Migration Modelling Framework, PCPP Modelling Framework

In reality, in the long-term, unemployment partly reflects mismatch between the types of labour skills on offer and those that are needed. In fact, by some targeting of skills in short supply, the extra migration intake is likely to reduce jobs mismatch, leading to some long-term reduction in unemployment. The extent of such a reduction is difficult to assess and so has not been factored into Econtech's modelling.

In contrast, under the PCPP Modelling Framework, employment of existing Australian residents is held fixed, and the unemployment effects reflect the historical labour market experiences of migrants in the years after they settle. A 10-year migrant acclimatisation period accounts for the temporary elevation in unemployment seen in Chart 5.5 for the PCPP modelling.

The PCPP approach of holding unemployment of existing Australian residents fixed under the increased skilled migration scenario assumes away one of the main issues of interest in migration modelling. It is also questionable to assume that extra skilled migrants have no impact on the labour market experiences of existing residents.

In particular, while weaker labour market outcomes for newly-arrived migrants reflect the fact that they have a temporary disadvantage in the labour market, this may advantage existing residents. Migration boosts labour demand (according to both the PCPP and Econtech), but existing residents may receive a greater benefit from this because employers rate them more highly than newly-arrived migrants. This view is reflected in Econtech's approach, which models overall labour market outcomes on the basis of total labour demand and supply. Under this approach, if migrants are faring relatively poorly during their acclimatisation period, existing residents will be faring relatively well.

Both modelling approaches find minimal effects on unemployment but for different reasons. Further, neither modelling approach takes into account that by some targeting of skills in short supply, the extra skilled migration intake is likely to reduce jobs mismatch, leading to some long-term reduction in unemployment.

Table 5.1
Dissection of Consumer Living Standards Effects
(Long-run: equilibrium effect in year 20)

	Extra Skill Migration Scenario (a)	No Migrant Transfers Scenario (a)	Suppressing T-o-T Effect Scenario (a)	No Migrant Transfers Scenario (b)	Suppressing T-o-T Effect Scenario (b)
Working-age share of pop'n	-0.2%	-0.2%	-0.2%	0.00%	0.00%
Employment rate	0.9%	0.9%	0.9%	0.00%	0.00%
Labour productivity	0.7%	0.7%	0.8%	0.00%	0.11%
Consumption share of GDP	-0.3%	-0.6%	0.0%	-0.29%	0.24%
Living standards	1.1%	0.8%	1.5%	-0.29%	0.35%

(a) Results show the percentage deviations from the Baseline Scenario.
(b) Results show the percentage deviations from the Extra Skilled Migration Scenario.

Table 5.2
Summary Population and Macroeconomic Effects
(Long-run: equilibrium effect in year 20)

	Extra Skill Migration Scenario (a)	No Migrant Transfers Scenario (a)	Suppressing T-o-T Effect Scenario (a)	No Migrant Transfers Scenario (b)	Suppressing T-o-T Effect Scenario (b)
Population:					
aged 0-14	4.7%	4.7%	4.7%	0.00%	0.00%
aged 15-39	4.9%	4.9%	4.9%	0.00%	0.00%
aged 40-64	3.4%	3.4%	3.4%	0.00%	0.00%
aged 65 plus	0.9%	0.9%	0.9%	0.00%	0.00%
working-age	3.5%	3.5%	3.5%	0.00%	0.00%
total population	3.7%	3.7%	3.7%	0.00%	0.00%
Employment	4.4%	4.4%	4.4%	0.00%	0.00%
Effective labour	5.1%	5.1%	5.1%	0.00%	0.00%
Real GDP	5.2%	5.2%	5.3%	0.00%	0.11%
Terms-of-trade	-1.1%	-1.3%	-0.2%	-0.13%	0.93%
Business capital stock	5.1%	5.2%	5.4%	0.06%	0.28%
Housing capital stock	5.4%	5.0%	5.9%	-0.40%	0.47%

(a) Results show the percentage deviations from the Baseline Scenario.
(b) Results show the percentage deviations from the Extra Skilled Migration Scenario.

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