Regionally targeted migration policy as an instrument for regional development: a general equilibrium assessment

by

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1 Introduction

Regional policy-makers have a considerable number of policy instruments with which to influence the spatial distribution of economic activity (see Figure 9.1 of Armstrong and Taylor, 2000). While many of these policies are designed with a regional policy objective in mind, some policy options involve the use of national economic policies in a regional discriminating way. In this paper we examine a policy that falls into the latter category, namely a regional discriminating immigration policy.

The promotion of economic development in areas outside of Australia's capital cities has long been a policy interest of the Australian Federal Government. The Australian Department of Infrastructure and Transport (2013, p. 9) notes that: "Aside from city states like Singapore and Monaco, Australia is the most urbanised nation on earth". This issue increased in prominence in the 1990s when concerns were raised that the gains from competition policy reforms were concentrated in major urban areas, particular along Australia's east coast (Industry Commission 1995; O'Conner et al. 2001; O'Neill and McGuirk 2002). Since 1996/97, immigration policy has been an explicit instrument in achieving the aim of regional development outside Australia's state capitals (Cameron, 2011; Hugo, 2008). In particular, a number of immigration programs are tailored to encourage immigrants to settle in areas outside of Australia's major population centres.

To encourage immigrants to settle in non-capital city regions, a number of migration schemes have been designed to ease the granting of visas to migrants intending to settle outside of Australia's major population centres. These include both a permanent skilled program and a temporary long-stay business visa program (or T457). While these programs are essentially designed to increase the Australian labour force's skill base, they carry conditions of employment which allows their use for a second purpose of directing skilled migrants to non-metropolitan regions.

T457 is a program which allows employers to bringing in skilled workers from overseas for up to four years to fill vacancies for which they cannot fill with local residents. In principle, employers in any location can apply to this program, and hence it is not specifically designed to direct migrants to settle in non-metropolitan areas. However, it can be, and is increasingly, used for that purpose, because of two main reasons. First, the T457 program imposes stricter conditions on labour market mobility of visa holders. Primary 457 visa holders must work in the same occupation for the same sponsor as specified in their visa nomination, and must not cease employment for more than 28 consecutive days. Any change in employer must be approved by the Australian Department of Immigration and Citizenship (see DIAC, 2012a). Thus, T457 visa holders nominated by a regional employer will have to work in the employer's region. Second, the program is flexible and can be adjust according to changes in labour demand.[1] Due to these features and other benefits to the economy, [2] the T-457 program is becoming increasingly important in Australia's migration policy. In the seven years from 2004/05, the size of Australia's annual T457 visa intake grew almost threefold, rising from 17 thousand to more than 48 thousand. The program makes up 47.3% of gross skilled migrant intake in the financial year 2011/12, and is projected to make up just under 60% of the gross skilled migrant intake for the period up to 2021/22 (DIAC, 2012f).

While by design the T457 program can help address short-term skill shortages, their efficacy in promoting regional development is not well explored. Studies on immigration and regional development have been mostly descriptive or qualitative in nature. Surveys, interviews or case studies were used to explore demographic and labour market characteristics of migrants; reasons for migration; factors that influence migrants to settle in regional areas; migrants' mobility; level of migrants' and their employers' satisfaction; and the social aspects of migration.[3] There have been few studies focusing specifically on the T457 program. Khoo et al. (2005), Khoo and McDonald (2006) is a survey on reasons for migration, employment circumstances and migration outcomes of T457 visa holders. Access Economics (2002a, 2002b) uses a macro-econometric model to assessed economic impacts of T457 program on the government budget and on Australia's living standard, but the study focuses on the

[1] For example, according to DIAC (2012f), the level of T457 intakes declined from 44 thousand in 2008/09 to just over 26 thousand during the economic downturn during 2009/10-2010/11 due to the global financial crisis, and then rose again to over 48 thousand in 2011/12 when the economy recovered from the crisis.

[2] See analysis of the impacts of the T457 program on government budget and Australia's living standard in Access Economics (2002a, 2002b).

[3] See, for example, a review of research on the use of skilled migration to address regional skill shortages by Cameron (2011).

economy as a whole, not on regional development. The contributions of migrants to regional Australia have been stated in terms of them settling there on arrival (Cully 2010). It is believed that "Skilled migrants who settle in regional Australia help support and grow regional economic activity. They help sustain and strengthen regional communities by filling critical skills shortages. They add vitality, diversity and innovation to our regional economies." (Crean, 2012, p.151). This seems especially so for T457 visa holders because, compared to the Australian average, they tend to be younger, have higher labour force participation rate, lower unemployment rate, and they concentrate in higher-skilled professional and managerial occupations (Access Economics, 2002b; ABS 2008a)

However, it is not clear whether regionally-targeted T457 programs can in any meaningful way impact on the spatial distribution of regional economic activity. First, T457 visa holders have been found to be a highly mobile group. On average, about 13% of them emigrate each year (DIAC, 2012f). Of those who stay in Australia, Khoo and McDonald (2006) found that over 7% change their place of residence within one year. A panel data of T457 visa holders for the period 2006-2012 show that on average 5.7% of those staying in the country move out of non-capital regions each year (DIAC 2012g).[4] Second, there could be a displacement effect in the labour market, where temporary skill migrants take up jobs which could have been filled by local residents. [5]

This paper provides the first quantitative assessment of the efficacy of temporary skill migration program in promoting economic development of regions outside of metropolitan areas in Australia. We use TERM-M, a general equilibrium model with extensive regional and migration details, to run 8 policy scenarios against a common baseline forecast for the period 2010/11-2021/22. In the first seven policy scenarios, we simulate a once-off targeted migration program, whereby the 2012/13 intake of 457 visa holders is increased by 1000 persons in each of the model's seven non-metropolitan regions. In the eighth scenario we simulate the same 1000-person increase in 457 numbers, but this time without directing them into any particular region; rather, they will settle across the model's 15 regions according to current settlement patterns. Simulation results show that over time, inter-regional migration

[4] This is only slightly lower than the mobility of permanent regional skilled migrants. Surveys by DIAC (2005a, 2005b) found that around 6% and 8% of principal applicants of the State Designated Migration Scheme and Regional Sponsored Migration Scheme respectively intend to move to another region in 12 months time.

[5] See, for example, ABC (2012) for recent high-profile cases where labour agreements were used to bring in temporary 457 workers to work on resource projects in regional Western Australia. See also Birrell and Heard (2012) for discussion on the displacement effects in the medical profession.

and labour market displacement effects result in a weakening of the increase in regional supply even in the short run. Over a decade this diminishing of the regionally-target program's effects is compounded by around 60 per cent of temporary visa holders returning overseas, so that for the targeted region there is little by way of a long term regional legacy effect.

The paper is organised as follows. Section 2 describes the theory and the database of the TERM-M model. Section 3 discusses the policy shocks implemented in the simulations. Section 4 provides a brief overview of the effects of the shocks on all non-capital regions in simulations. Section 5 provides a deeper analysis for the results, taking the Rest of Western Australia as an example. Section 6 further discusses macroeconomic effects of the shocks on all regions. Section 7 concludes the paper.

2 The TERM-M model

2.1 Theory

Broadly, the research question requires a model that contains both regional economic detail and labour market detail. Hence, we use a bottom-up multi-regional model based on TERM (The Enormous Regional Model) (Horridge, 2011) integrated with a detailed labour supply module based on the labour supply theory pioneered by Dixon and Rimmer (2008).

TERM explicitly captures the behaviour of industries, households, investors, government and exporters at the regional level. The theoretical structure of TERM follows the familiar neoclassical pattern common to many applied general equilibrium models. Producers in each region are assumed to minimize production costs subject to a production technology that allows substitution between primary factors (labour, capital and land) and between geographical sources of supply for specific intermediate inputs. Demand for effective input of labour to each regional industry is defined over labour distinguished by occupation. A representative household in each region purchases goods in order to obtain the optimal bundle in accordance with its preferences and disposable income. Investors seek to maximize their rate of return, while demand by foreigners is modelled via export demand functions that capture the responsiveness of foreigners to changes in export supply prices. TERM's theoretical and data structures are well documented in Horridge et al. (2005) and Horridge (2011), and so we do not expand further on the structure of TERM in this paper.

Migration details are included in the labour supply side of the model. The labour supply theory imposes a stock/flow dynamic on highly disaggregated labour market groups. Between years, sub-populations, defined by age, region, labour force status and visa status, transit between age and visa status categories. Within years, these same sub-populations make utility-optimising offers to various labour market activities, such as working in a particular occupation, or leaving the labour force, or go overseas.

Five equations are fundamental to the operation of the labour market module. The first equation groups people at the start of year to categories based on their labour market activities o[6] in region r[7] in year *t-1*, taking into account changes in their age groups a[8] and visa type v[9] via the mediation of a transition matrix.[10]

$$CAT^{t}_{(o,r,v,a)} = \sum_{aa \in AGE} \sum_{vv \in VISA} ACT^{t-1}_{(o,r,vv,aa)} * T_{(vv,aa,v,a)} \quad \text{for all } (o,r,v,a) \;\; o \neq \text{New} \qquad (1)$$

$$CAT_{(New,r,v,a)} = exogenous \qquad \text{for all } (r,v,a) \qquad (2)$$

where

$CAT^{t}_{(o,r,v,a)}$ is the stock of working age population at the start of year *t*, grouped by their labour market activity *o* and region of residence *r* in year *t-1*, and age and visa types at the start of year *t*.

$CAT_{(New,r,v,a)}$ is the new entrants to the working age population. The new entrants consist of people turning 15 in year *t*, and new permanent and temporary migrants from overseas. Note that the "New" element is an addition to the labour market functions (o) in equation (1).

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[6] Labour market activities consist of major occupational groups, short-term unemployment, long-term unemployment and not in the labour force. The major occupational groups are: Managers; Professionals; Technicians and Trades Workers; Community and Personal Service Workers; Clerical and Administrative Workers; Sales Workers; Machinery Operators and Drivers; and Labourers.

[7] 15 Australian regions (the ACT plus 7 capital cities and 7 Rest of the remaining 7 Australian states and territories).

[8] Namely, seven10-year working age groups, starting from 15 to 75+.

[9] Namely, Citizen; Skilled permanent visa; Family visa; Humanitarian visa; Other permanent visas; Student visa; Temporary long-stay business visa 457; Other temporary visas; and New Zealanders.

[10] Note that, $CAT^{t}_{(New,r,v,a)}$ is determined exogenously. $CAT_{(New,r,v,a)}$ is the new entrants to WAP. The new entrants consist of people turning 15 in year *t*, and new permanent and temporary migrants from overseas. Note that the "New" element is an addition to the labour market functions (o) covered by equation (1).

$ACT^{t-1}_{(o,r,vv,aa)}$ is the number of people aged *aa* holding visa *vv*, who performed activity *o* in region *r* during year $t-1$;[11]

$T_{(vv,aa,v,a)}$ is the transition matrix showing the probability of someone age *aa* holding visa *vv* in year *t-1* to move to age group *a* with visa *v* at the start of year *t*. This matrix will be strongly diagonal. However, it will also contain important off-diagonal components describing elements of government policy. For example, every year some proportion of people in the temporary business long-stay 457 category may apply to and be granted a permanent skilled visa.

Note that equation (1) does not determine how people change their labour market status or region of residence from year to year. These changes are determined by an optimisation problem, where at the beginning of year *t* people in all categories offer their labour to a labour market activity in a region to maximise their utility. This results in a labour supply function in the form of equation (2), which describes how people in categories $CAT^{t}_{(oo,rr,v,a)}$ offer their labour to specific labour market activities *o* in region *r* in year *t* in response to differences in relative incomes in those labour market activities.

$$L^{t}_{(oo,rr,v,a,o,r)} = CAT^{t}_{(oo,rr,v,a)} * \left[\frac{\left(B^{t}_{(oo,rr,v,a,o,r)} * ATW_{(o,r)} \right)^{\eta}}{\sum_{q} \sum_{p} \left(B^{t}_{(oo,rr,v,a,q,p)} * ATW_{(q,p)} \right)^{\eta}} \right] \quad (2)$$

where

$CAT^{t}_{(oo,rr,v,a)}$ is the stock of working age population in each domestic labour market category oo in domestic region *rr* at the start of year t.

$L^{t}_{(oo,rr,v,a,o,r)}$ is the labour offer from all labour market categories *oo* in region *rr*, to all labour market activities o in region *r*. In addition to offering their labour to domestic activities, our model theory also allows people to emigrate. That is, in addition to domestic labour market functions *oo* and domestic region *rr* in categories $CAT^{t}_{(oo,rr,v,a)}$, the

[11] A note on our set index notation: throughout this section we use double letters (such as *oo*, *rr*, *vv*) to denote the initial position, and the single letter (such as *o*, *r*, *v*) to denote the final position of a category or activity. For example, in the coefficient $T_{(vv,aa,v,a)}$, *vv* and *aa* denote the visa type and age of a group of people during year *t*-1, and *v* and *a* denote their visa and age at the beginning of year *t*.

new activity (o) and region (r) in $L^t_{(oo,rr,v,a,o,r)}$) include emigration to Rest of the World. Note also that all categories at the beginning of year *t* can offer their labour to all activities during year *t*, except: (i) employed people can stay employed or become short-term unemployed, but cannot become long-term unemployed; (ii) short-term unemployed people can become employed or long-term unemployed, but cannot stay short-term unemployed; (iii) new entrants can become employed or short-term unemployed, but not long-term unemployed;[12] and (iv) we assume that immigrants do not emigrate in the first year of their arrival.

$ATW^t_{(o,r)}$ is the real after-tax wage rate in activity *o* in region *r*.

$\sum_q \sum_p \left(B^t_{(oo,rr,v,a,q,p)} * ATW_{(q,p)} \right)$ is average real after-tax wage for all categories (*oo*,*rr*,*v*,*a*).

η is a parameter that reflects the ease with which adults can shift between activities. Following Dixon and Rimmer (2010), we set η at 2 for all domestic activities. It is assumed that there is a higher level of difficulty for shifting between domestic and overseas activities, and hence η is set at 1 for overseas activities.

$B_{(oo,rr,v,a,o,r)}$ is a occupational and regional mobility matrix which shows the probability of people changing occupation or region of residence even in the absence of changes in relative prices. It captures exogenous non-wage factors, such as preferences, that may motivate people from category (*oo*,*rr*,*v*,*a*) to offer their labour to activity *o* in region *r* .

Equation (3) translates labour supply by persons into labour supply in hours.

$$LH^t_{(o,r,v,a)} = HPP^t_{(o,r,v,a)} \times LS^t_{(o,r,v,a)} \qquad (3)$$

where

$HPP^t_{(o,r,v,a)}$ is the number of hours worked per person in occupation (*o*,*r*) by persons with visa status *v*, age *a*.

$LH^t_{(o,r,v,a)}$ is the number of hours of labour supplied to occupation *o* in region *r* by persons with visa status *v*, age *a*.

[12] The exceptions (i) to (iii) stem from the fact that categories are grouped by their labour market activities in year *t-1*, and by definition, short-term unemployment is unemployment of not more than 12 months.

$LS^{t}_{(o,r,v,a)}$ is the total number people in activity o in region *r* by visa status *v* and age *a*.

The distinction between persons and hours is important because there is a big difference in the number of working hours per person per week between visa types. For example, while the Australia-wide average number of working hours per person per week is approximately 33 hours (ABS, 2010a), the number is about 20 for Student visa holders (ABS, 2011a).

In equation (4), the total number of working hours supplied to occupation *o* in domestic region *r* is determined as:

$$LS^{t}_{(o,r)} = \sum_{v \in VISA, a \in AGE} LH^{t}_{(o,r,v,a)} \tag{4}$$

Finally, Equation (5) links the labour supply module with the TERM model.

$$LD^{t}_{(o,r)} = LS^{t}_{(o,r)} * FLAB_{(o,r)} \tag{5}$$

Equation 5 equates labour demand to labour supply and a shift variable. Labour demand is determined via the factor demand equations specified in the TERM model. Labour supply is determined in the labour market module via Equation 4. With the shift variable set exogenously, labour demand is equal to labour supply and any disequilibrium between labour demand and supply will cause the wage to adjust.

TERM-M is the first model to contain a detailed treatment of labour supply by visa type and the transition between visa types for Australia. The distinction between visa types is important for the assessment of the effects of migration policies on the economy for two reasons. First, migrant groups differ in their labour market characteristics. For example, migration data (ABS, 2011a; DIAC 2012f, 2012g) have shown that compared with other migrant types, skilled migrants typically have higher labour market participation rate and lower unemployment rate, and are more likely to work in managerial and professional jobs (ABS, 2011a). They also work more hours per year than holders of student and working holiday visas. Second, holders of different visa types have different regional and occupational mobility. By definition, temporary migrants have a much higher emigration rate than permanent residents. Temporary visas are often a pathway to permanent visas, and once a temporary visa holder becomes permanent resident, their propensity to emigrate falls. Domestic mobility also differs between different visa types because of different visa conditions. For example, as discussed earlier, the 457 visa imposes more restriction on visa holders' movement between occupations and regions than other visa types. Therefore, it is

important not only to distinguish these visa types, but also to model the changes among them, which is the function of the visa transition matrix.

The model is solved with GEMPACK – a general equilibrium modelling package (Harrison and Pearson, 1996).

2.2 The model database

The database for the TERM module of the model was built using Australia's input-output (IO) table for the year 2005/06 (ABS, 2009). For the process of converting the IO data to the format suitable for the detailed regional data for the TERM model, see Horridge (2011). The database is then updated to the year 2011 using available historical economic data for the period 2006/07 – 2010/11.

The labour supply module (equations 1 to 5) requires the following matrices: the lagged activity matrix $ACT^{t-1}_{(o,r,vv,aa)}$; the age and visa transition matrix $T_{(vv,aa,v,a)}$; the matrix of new entrants $CAT^{t}_{New,r,v,a}$; the occupational and regional mobility matrix $B_{(oo,rr,v,a,o,r)}$, and the hour-worked matrix $HPP^{t}_{(o,r,v,a)}$.[13] The database construction process aims to first create all of these matrices for the period 2007/08, and then update them to the period 2010/11. The compilation of these matrices is described below.

The compilation of the lagged activity matrix $ACT^{t-1}_{(o,r,vv,aa)}$ for the year 2006/07 started from Census 2006 (ABS, 2006). The Census provided information on age, region of residence, labour force status, occupation of employment for Australian citizens and non-citizens, but not for detailed visa types. The non-citizen part of the Census was then disaggregated into the required 8 non-citizen visa types using stock data for temporary and permanent visa holders (DIAC, 2011) and confidentialised unit record files from the Characteristics of Recent Migrants surveys in 2007 and 2010 (ABS 2008a, 2010a). Data for both citizens and non-citizens were then scaled to ensure that they sum to ABS's working age population statistics for the financial year 2006/07 (ABS, 2012a-2012d).

Next, the transition matrix $T_{(vv,aa,v,a)}$ was estimated as a product of the age transition matrix and the visa transition matrix. The age transition matrix was estimated using demographic data on age distribution and death rates (ABS, 2011, 2010d). The visa transition matrix was

[13] The matrix of average after-tax wage rate $ATW_{(o,r)}$ is determined endogenously in the model.

estimated with two steps. In the first step, the initial transition matrix was derived from information contained in ABS surveys of recent migrants for 2007 and 2010 (ABS, 2008a, 2010a) on visa types of visa holders on arrival and at survey time, and DIAC panel data for the period 2006-2012 for over 317 thousand temporary visa holders (DIAC, 2012h). In the second step the initial visa transition matrix was adjusted so that it tracked the stock and flow migration data supplied by DIAC for each of the years in the period 2006-2012 (DIAC, 2011; 2012f, 2012g).

The matrix of new entrants $CAT^{t}_{New,r,v,a}$ was created using two data sources: (i) ABS's demographics data (ABS, 2011) for the number of domestic new entrants, *i.e.* people 14-year of age, turning 15 in the following year; and (ii) DIAC data on inflows and outflows of migrants (DIAC, 2012f).

The occupational and regional mobility matrix $B_{(oo,rr,v,a,o,r)}$ was estimated using labour mobility data for 2008 and 2009 (ABS, 2008b; 2010b) and Census 2006 information on people's regions of residence on Census night and one year earlier.

The average working hours per person per year matrix $HPP^{t}_{(o,r,v,a)}$ was created using information from CoRM 2010 (ABS, 2010a, 2010c) and Tan et al. (2009).

Up to this point the compilation of the labour supply data base for the year 2007/08 was completed. The time dependent matrices $ACT^{t-1}_{(o,r,vv,aa)}$, $N^{t}_{r,v,a}$ and $HPP^{t}_{(o,r,v,a)}$ in the database were then updated to the period 2010/11 in order to match the updated TERM database, using labour market, demographic and migration statistics for the period 2006-2012 (ABS, 2012a-2012d, 2011; DIAC, 2011, 2012g).

3 Simulation design

To investigate the efficacy of the T457 temporary visa programs as an instrument of regional development, eight simulations are undertaken. In the first seven simulations a targeted migration program is simulated, whereby the increase in T457 visa intake is directed to each of the model's seven non-metropolitan regions. In terms of equation (3) these policy shocks represent a 1000 person expansion in the value of $CAT^{2012/13}_{(New,r,T457,a)}$, where *r* is the region listed in Table 1. In the discussions below these policy scenarios are called "targeted policies". In the eighth simulation the same 1000-person increase in T457 numbers is simulated, but this

time without directing them into any particular region. It is assume that the new arrivals will settle across the model's 15 regions according to current settlement patterns. This policy scenario is called "untargeted policy".

Consistent with equation (3), these T457 visa holders then supply labour to occupations and non-employment activities, both within the region in which they initially arrive, and in other regions. The percentage deviations in the working age population (WAP) in the policy year 2012/13 due to the increase of 1000 persons in the targeted regions are reported in Table 1.

Table 1. Regional working age population under alternative policy scenarios in 2012/13

			Under the 7 targeted simulations (increase of 1 thous. pers. in each region)	Under the untargeted simulation (increase of 1 thous. pers. in the whole country)	
Sim	Region	Baseline level ('000 persons)[(a)]	% increase in WAP	Number of new arrivals to the region ('000 persons)[(b)]	% increase in WAP
(1)	(2)	(3)	(4)	(5)	(6)
1	Rest of New South Wales (RoNSW)	2,141.7	0.047	0.0378	0.0018
2	Rest of Victoria (RoVIC)	1,188.5	0.084	0.0198	0.0017
3	Rest of Queensland (RoQLD)	2,073.2	0.048	0.0783	0.0038
4	Rest of South Australia (RoSA)	343.1	0.291	0.0052	0.0015
5	Rest of Western Australia (RoWA)	473.7	0.211	0.0247	0.0052
6	Rest of Tasmania (RoTAS)	236.0	0.424	0.0006	0.0003
7	Rest of Northern Territory (RoNT)	69.3	1.443	0.0039	0.0056
8	Australia	18,967.4		1	0.0053

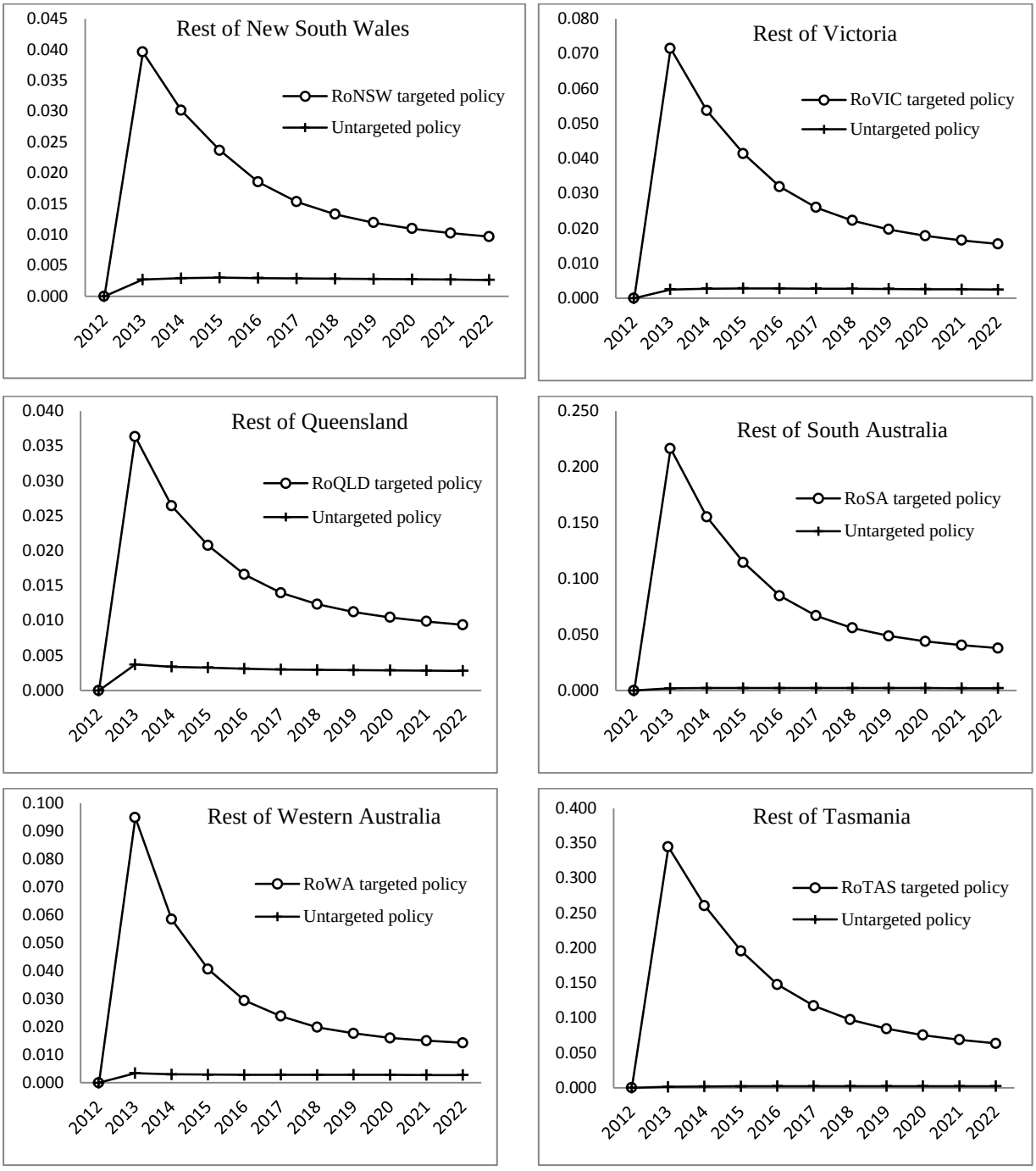
Notes: (a) Model database, compiled based on data sources discussed in Section 2; (b) The number of new arrivals to each of the region is proportional to the share of the region in total new T457 visa intake in the baseline case. For example, the number of 0.0378 thousand new arrivals in RoNSW (row 1, column 5) corresponds to RoNWS's share of 3.78% in total T457 intake in 2012/13. Note that the sum of arrivals to all non-capital city regions in this column is 0.17 thousand person. The remaining 0.83 thousand persons go to capital cities.

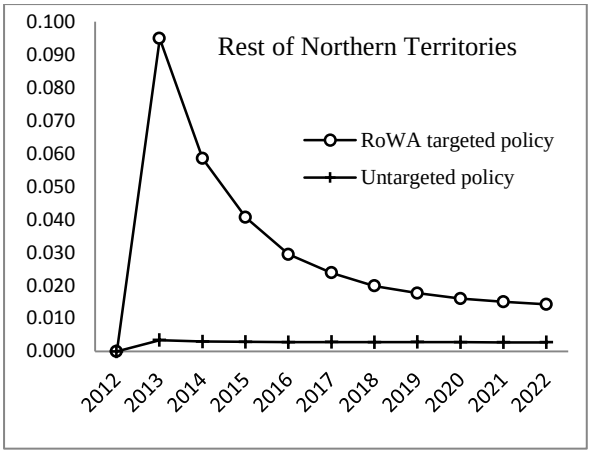
4 Simulation results

Under all 8 policy scenarios, the total number of working age population increases by 1 thousand persons in the year 2012/13. However, the impacts on regional GDP are different between regions (Figure 1). This is because, as can be seen from column 4, Table 1, the same absolute addition to WAP results in different deviations for regional WAP relative to base case. This in turn, causes different deviations in regional employment and GDP.

Figure 1. Regional GDP under alternative simulations

(Percentage deviation from baseline)





In the short run, targeted migration programs cause larger positive deviations in regional real GDP than the untargeted program. However, in the long run, regional GDP results differ little between the targeted and untargeted programs. To uncover the drivers of these results, in the sections below we will examine more closely the results in the targeted and untargeted migration programs for RoWA.[14] The mechanisms of the impacts of the policies on RoWA are similar to those in other regions.

5 The effects of T457 migration program targeted at RoWA

This section discusses the results from the untargeted and RoWA targeted policy of increasing the intake of T457 visa holders by 1000 person.

5.1 National results

Our ultimate aim is to understand the consequences of the regionally targeted program for regional development. Nevertheless, as we shall see, the national macro consequences of the policies have a bearing on the regional economic consequences. While it is true that the region in which the 1000 persons expansion occurs has some influence on the national macroeconomic results, in the broad both scenarios can be viewed at the national level as a 1000 person expansion in the working age population in the first year of the policy (Figure 2). Thereafter, the WAP deviations steadily decline. This reflects the operation of equation (3). Each year, some proportion of T457 visa holders return overseas[15]. In terms of equation

[14] In recent years, RoWA has been the region with high intake of 457 visa holders to work on resource projects (see, for example, ABC 2012).

[15] Some also die, but this explains only a small fraction of this decline.

Not only 457 visa holders. Via equation (1) each year some proportion of 457 visa holders who remain in the country transition to other visa categories.

(3), this fraction is represented by the percentage difference between L and CAT[16]. For T457 visa holders, the annual propensity to return overseas is approximately 13.5%. At the same time, via equation (1) the propensity for T457 to transition to other visa categories is approximately 18.6%. These visa categories have lower emigration propensities than the T457 category. This accounts for the gradual stabilisation of the national WAP deviation in Figure 2. The deviation in employment under both policies closely follows the deviation in WAP.

Figure 2. Nation-wide working age population and employment under alternative policies

(number of persons, deviations from baseline)

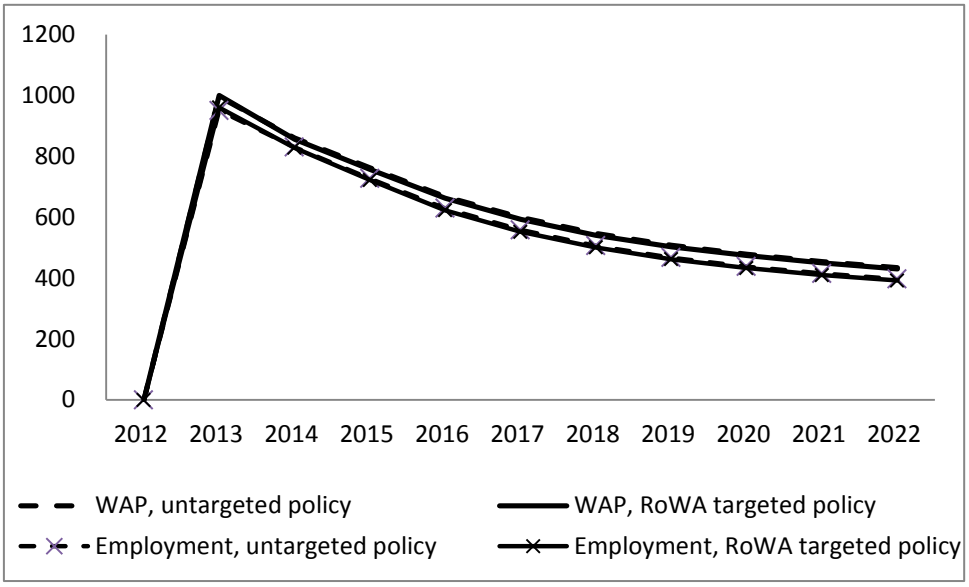


Figure 3 reports results for employment, capital stock, real GDP and the average real wage at the national level. These results are very similar under both targeted and untargeted migration policies.

Common features Figure 3 for the two policy scenarios are as follows. The positive deviation in working age population generates a positive deviation in labour supply and employment (Figure 3). In 2012/13 Australia's working age population is projected to be 18,967 thousand persons respectively (last row, Table 1). The increase in 1000 persons represents 0.0053% increase in the WAP but about 0.009% for employment, because T457 visa holders have a

[16] Movement in the relative wage term in equation (2) exerts only a small influence on the fraction.

higher labour force participation rate than economy-wide average.[17] Similar to the deviation in WAP, the employment deviation peaks in the first year of the simulation. Thereafter it gradually declines as the T457 visa holders emigrate. A proportion of T457 visa holders also become permanent migrants, who have lower emigration rates than the temporary T457 visa holders, hence the increase in 2012/13 T457 inflows generates a long-run permanent increase in employment. Capital stocks are sticky in the short run, since they can only deviate from baseline if investment deviates from baseline. With the capital stock responding only gradually to the positive employment deviation, in the short run the labour/capital ratio rises relative to baseline (Figure 3). The short-run increase in the labour/capital ratio causes the marginal product of capital, and with it, the rate of return on capital, to rise relative to baseline. Our model assumes a positive relationship between investment and rates of return. Hence, investment rises relative to baseline in the short run. Over time, the positive deviation in real investment causes the capital stock to rise relative to baseline (Figure 3). By the end of the simulation period the employment and capital deviations are of a similar magnitude, signalling a return of the labour/capital ratio to close to its baseline value. With both employment and the capital stock above baseline, the real GDP deviation is positive (Figure 3).

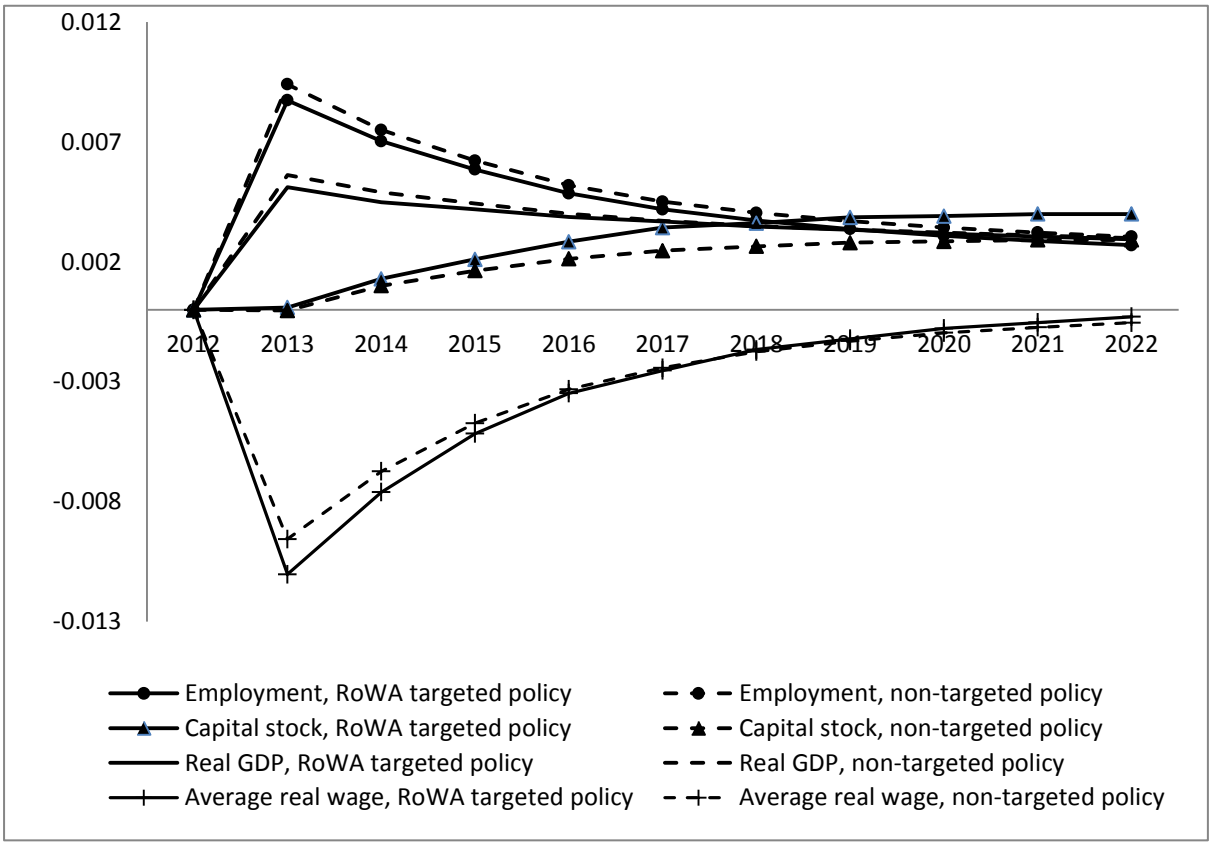
However, we note that under the RoWA targeted policy the short-run deviation for wagebill-weighted employment and GDP is lower, and the long-run deviation for capital stock is higher, than under the untargeted policy. This is because the negative deviation in the real wage due to the increase in labour supply is slightly larger in the RoWA targeted policy than under the untargeted policy (Figure 3). Industries in RoWA are relatively more capital intensive than economy-wide average, and hence the region has relatively less elastic aggregate supply curve than economy-wide average. Under the RoWA targeted policy, the large negative deviation in the RoWA wage rate causes a larger negative deviation in the average national real wage than that under the untargeted policy. This explains the lower positive deviations in wagebill-weighted employment and, in turn, a lower positive deviation in real GDP under the RoWA targeted policy than under the untargeted policy. However, as industries in RoWA is relatively more capital intensive than economy-wide average, the RoWA targeted policy causes a larger long-run aggregate capital stock positive deviation

[17] According to the Characteristics of Recent Migrant Survey (ABS, 2008a, Table 2), the labour force participation rate of 457 visa holders is 87.1%, whereas it is approximately 66% for the whole working age population.

than that in the untargeted policy. This explains the long-run convergence of real GDP under the two policies.

Figure 3. Nation-wide real GDP, employment, capital stock and average real wage under alternative simulations

(*Percentage deviation from baseline***)**



5.2 Results for Rest of Western Australia

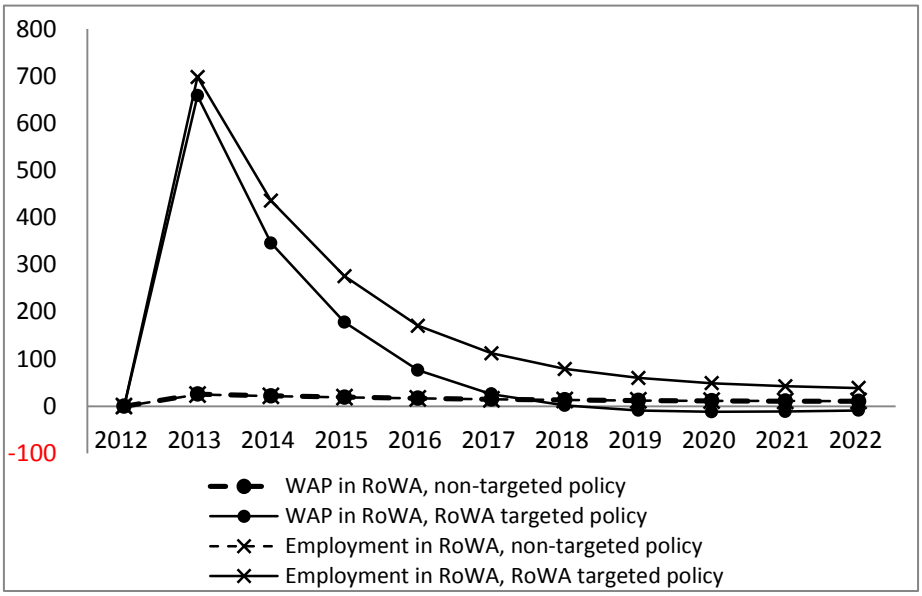
This section examines the economic impacts of the targeted and untargeted migration policies on the RoWA region.

5.2.1 Working age population and employment

Figure 4 reports the deviation in WAP and employment in RoWA under alternative policy simulations. As expected, deviations in WAP and employment are much higher under the targeted program than under the untargeted one, because much fewer people arrive to the region under the latter (see Table 1). However, even in the first year of the targeted policy with 1000 person arrival to the region, the deviations in both WAP and employment are less than the 1000 persons. After that the positive deviations in both WAP and employment decline rapidly over time, with the deviation in employment stays slightly higher than that in WAP.

Figure 4. Working age population and employment in RoWA under alternative simulations

(Number of persons, deviation from baseline)



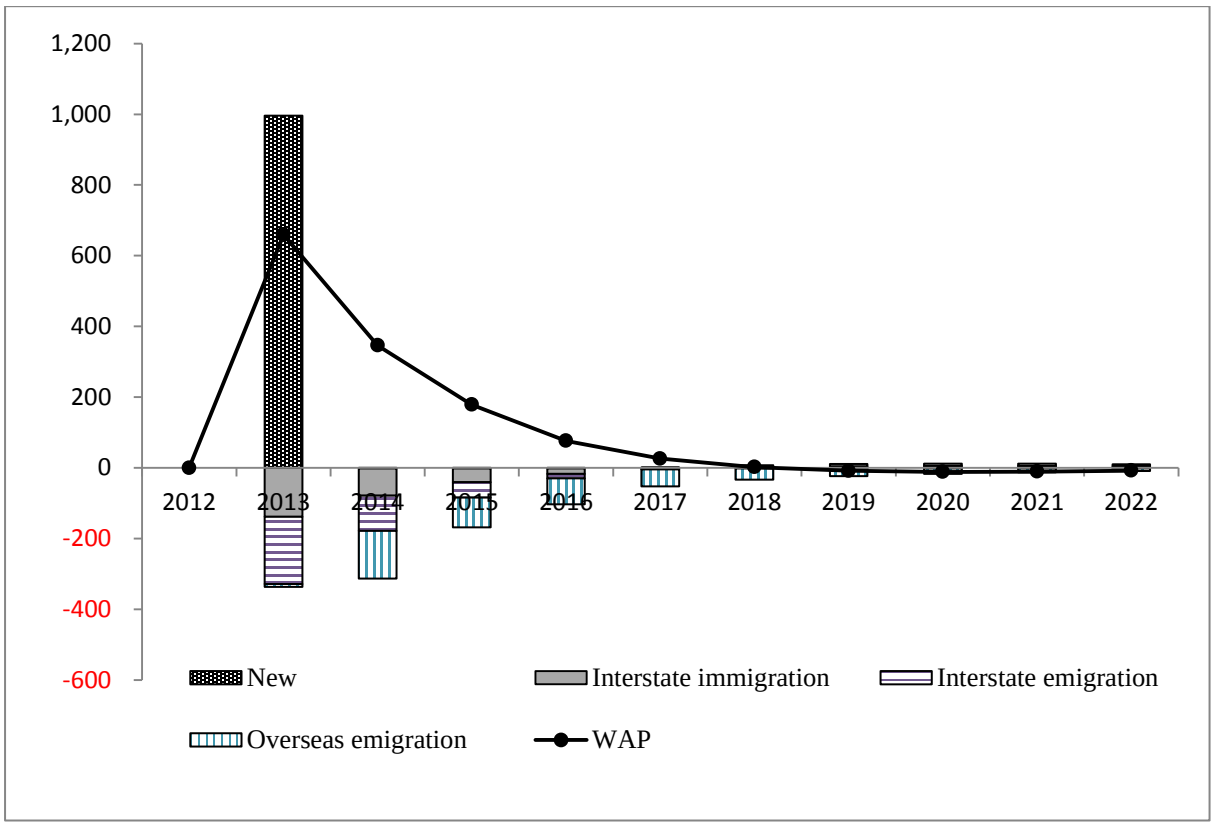
To understand the forces behind the WAP deviation in RoWA in the targeted migration program, we decompose it into the contributions of the flows in and out of the region (Figure 5). The inflows include new entrants into WAP (both domestic and foreign) and interregional immigrants[18]. The outflows include emigration to other states and overseas.

In the first year of the targeted policy, there is a positive contribution of new entrants into the RoWA region compared with the baseline due to the increased inflows of T457 visa holders into the region. However, the contributions from interregional migration are negative because the inflows from other states decline and the outflows to other state increase. From the second year of the policy onwards, overseas emigration from the region also increases, contributing negatively to the WAP deviation in the region. The negative contributions from overseas emigration continue throughout the simulation period. The negative contributions from interregional migration continue until about 2016, and then reverse to become slightly positive.

[18] There are also deaths, but the deviation in the death numbers is negligible, and hence is not included in Figure 5.

Figure 5. Contribution of population flows to the deviation of WAP in the Rest of Western Australia under the RoWA targeted policy

(*Number of persons, deviation from baseline***)**

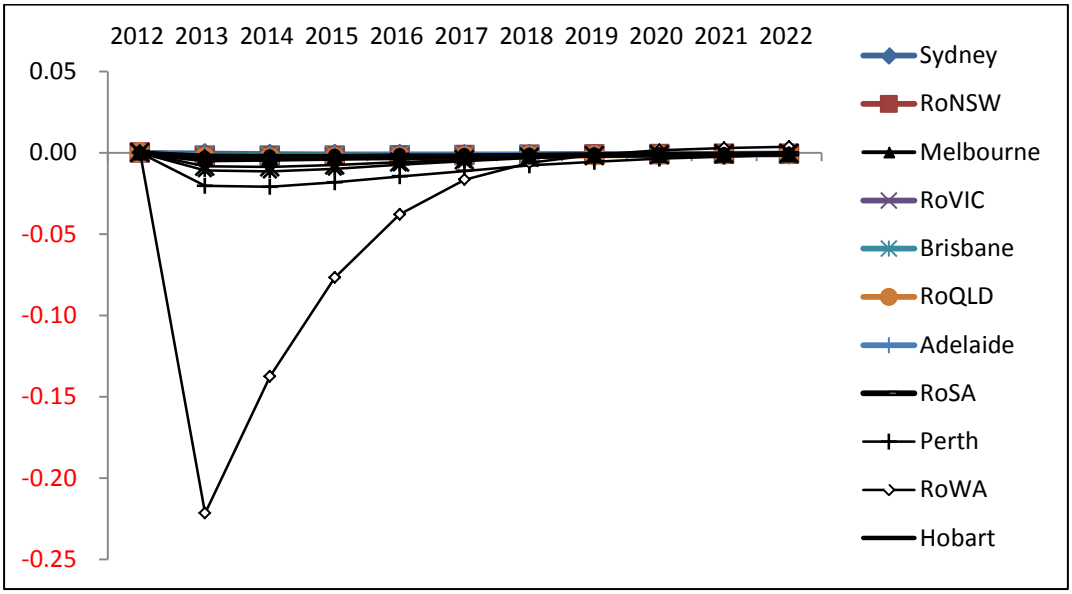


The main reason for the deviations in interregional migration is the deviations in the real after-tax wage rate in the region compared with the wage rate in other region. In the short run, the increase in labour supply in RoWA compared with the baseline causes a negative deviation in the region's wage rates (Figure 6). According to equation (3), this discourages people to move from other regions to RoWA, and encourages more people to move from RoWA to other regions. As people move from RoWA to other regions, the wage rates in other regions also fall (Figure 6). The region with the second largest wage fall is Perth, because Perth is the biggest destination for people moving out of RoWA.[19] The wage rates in other regions only fall slightly. In the long-run, as the number of WAP comes back to the baseline level, the wage rates also come back to the baseline level.

[19] According to Census 2006, more than two third of those moving out of RoWA during the year before the Census night moved to Perth (ABS, 2006).

Figure 6. Wage rate by region under the RoWA targeted policy

(*Percentage deviation from baseline*)



Employment deviation is positive because the increase in labour supply causes the wage rate to fall and employment to rise. However, employment deviation is slightly higher than that of WAP because the newly-arrived T457 visa holders have higher than average labour force participation rate and lower than average unemployment rate.[20]

5.2.2 Other macroeconomic effects

Table 2 reports macro results for RoWA under targeted and untargeted policies. In the first year of the policy the positive deviations in all macroeconomic indicators for RoWA under the targeted policy are larger than under the untargeted policy. The main reason is that employment deviation under the RoWA-targeted policy is much larger than that under the untargeted policy. In the RoWA-targeted scenario, wagebill-weighted employment deviation is 0.25% (row 2, Table 2), slightly larger than the deviation in employment by person of 0.22% discussed in the previous section. This is because T457 visa holders tend to work in managerial and professional job with higher than average wage rates. The positive deviation in employment causes positive deviations in GDP and investment under the same

[20] According to the Characteristics of Recent Migrant Survey (ABS, 2008a, Table 2), the labour force participation rate of 457 visa holders in November 2007 was 87.1%, whereas it was 66.2% for all visa categories, including citizens. As regard unemployment rate, the unemployment rate of 457 visa holders are lower than economy-wide average because design all primary 457 visa holders are employed, and visa holders comprise about half of all 457 visa grants over the period 2007/08-2011/12 (DIAC 2012i). In our baseline forecasts for 2012/13 unemployment rate of 457 visa holders is 3.4%, whereas the economy-wide average unemployment rate is 5.1%.

mechanisms as discussed in Section 5.1 for national results. Private and public consumptions rise with GDP. All deviations in investment and consumption are lower than the deviation in GDP, hence the balance of trade moves toward surplus. Imports rise to cater for increased demand from production, investment and consumption, and export rises even more. Consistent with the rapid decline in employment deviations, the deviations of other macroeconomic indicators also decline rapidly. By 2022, the deviations are only slightly higher than those in the untargeted policy.

5.3 Results for Perth under the RoWA- targeted policy

Interestingly, simulation results show that in the RoWA-targeted policy benefits not only the RoWA region, but also Perth, and hence the Western Australia state as a whole. This is because, as discussed earlier, Perth is the most likely destination for people who leave RoWA.

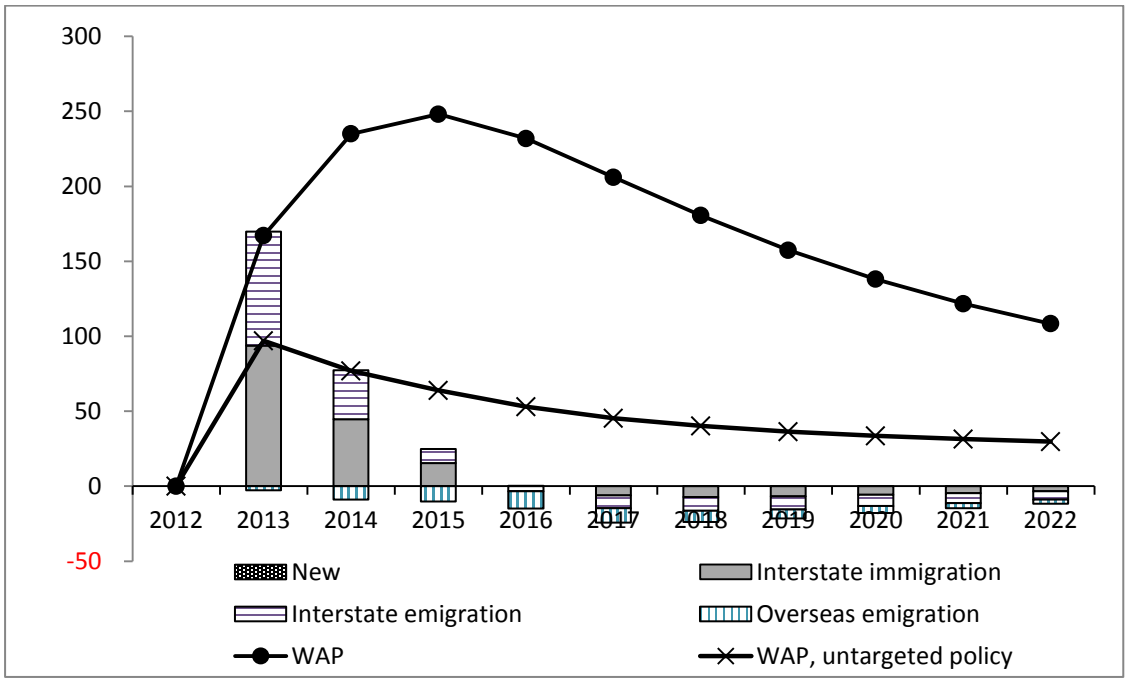
Table 2. GDP income and expenditure components for RoWA under alternative policies
(Percentage deviations from baseline)

	2013	2018	2022
A. RoWA targeted policy			
1.Real GDP	0.095	0.020	0.014
2.Employment (wagebill weighted)	0.252	0.023	0.012
3.Capital stock	0.000	0.023	0.020
4.Real private consumption	0.076	0.018	0.014
5.Real investment	0.074	0.021	0.014
6.Real public consumption	0.023	0.011	0.009
7.Export volume	0.026	0.011	0.008
8. Import volume	-0.005	0.009	0.007
B. Untargeted policy			
9.Real GDP	0.003	0.003	0.003
10.Employment (wagebill weighted)	0.009	0.004	0.003
11.Capital stock	-0.000	0.002	0.003
12.Real private consumption	0.004	0.003	0.003
13.Real investment	0.004	0.004	0.003
14.Real public consumption	0.005	0.003	0.003
15.Real export	0.001	0.004	0.004
16.Real import	0.001	0.004	0.004

On the other hand, RoWA is the most likely destination for people who leave Perth. Census 2006 data show that between the Census night and one year earlier, out of 5.8% of people who left RoWA, 3.98 percentage point, or 68.4%, went to Perth; and out of 2.6% of people who left Perth, 1.44 percentage point, or 55.3%, went to RoWA. Therefore, when the

wage rate fall sharply in RoWA under the targeted migration program (Figure 6), more people will leave RoWA for Perth, and fewer people will leave Perth for RoWA. This largely explains the positive contributions of both interregional immigration and interregional emigration to employment deviation in Perth, as reported in Figure 7. The positive deviation in Perth's employment leads to changes in economic indicators similar to those in RoWA, only at a much smaller scale.

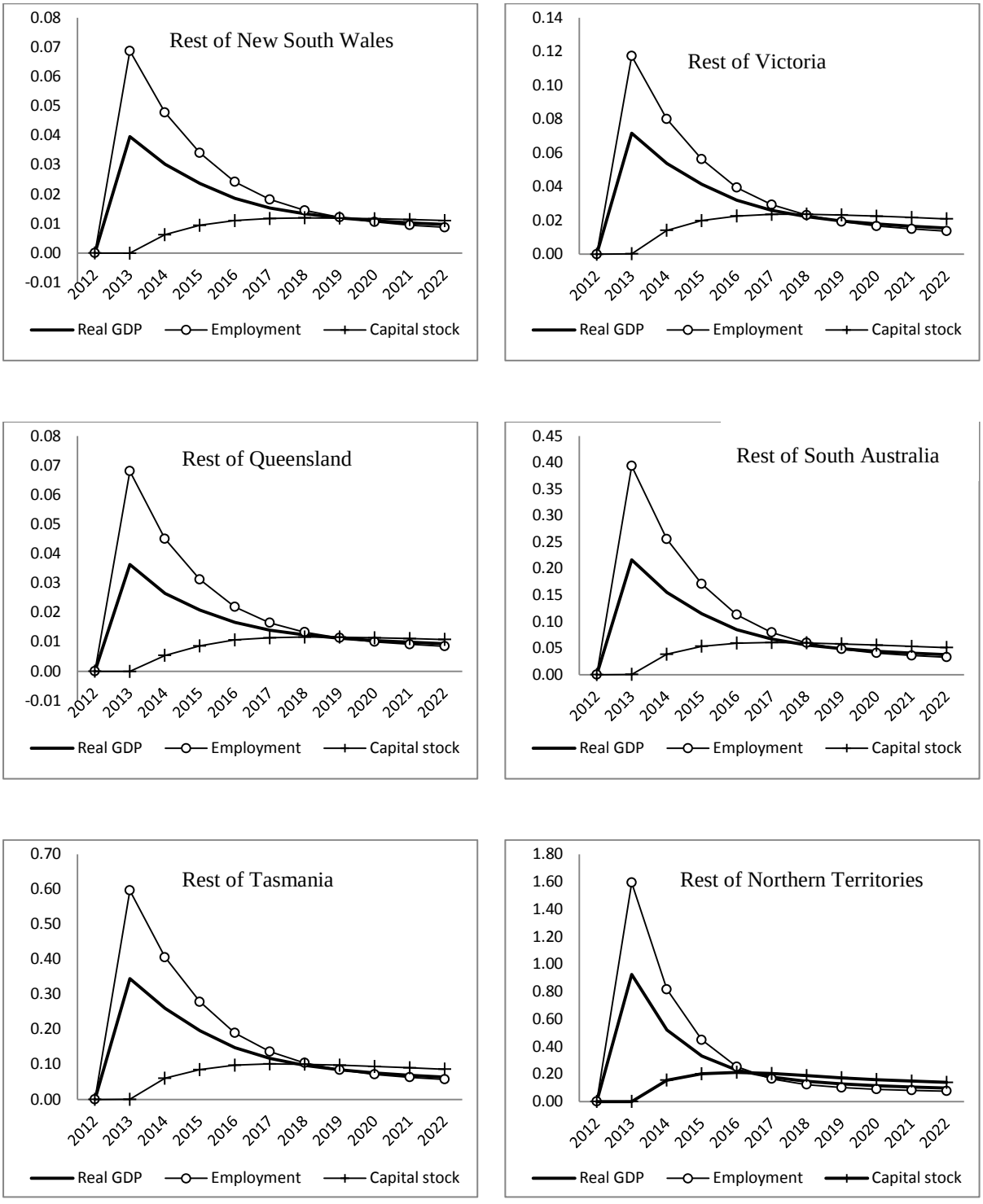
Figure 7. Contribution of population flows to the deviation of WAP in Perth under the RoWA targeted policy, unless otherwise stated (*Number of persons, deviation from baseline*)



6 Results for other regions

Figure **8** reports macro results for other non-capital city regions in targeted simulations. The pattern of changes in the deviation for employment, real GDP and capital stock in all regions are similar to that in RoWA. The differences in the magnitude of the deviations are largely determined by the differences in the magnitude of the shocks to the regional WAP as reported in column 4, Table 1.

Figure 8. Real GDP, Employment and Capital stock in non-capital city areas under targeted migration programs *(Percentage deviations from baseline)*



For all regions, a once-off targeted migration program does not seem to bring sustained increase in economic activities in the long run. Over times, new migrants move to other regions, mostly to capital cities, or go overseas. These results are consistent with

opinions from DIAC, such as "migration is an unlikely remedy for sustained population decline in regional Australia" (Cully, 2010, p.12), or "no credible policy will stop 90 per cent of future immigrants initially or eventually settling in the capital cities." (DIAC's Red Book briefing for Julia Gillard, cited in Bourke, 2011).

7 Concluding remarks

Over a number of years the Australian Government has used regionally-discriminating migration policy as an instrument to target a reduction in the nation's perceived over-urbanisation.[21] The policy is implemented by a program of easing the granting of visas to skilled migrants intending to settle outside of Australia's major population centres. The policy is employed both for permanent skilled visa classes and for temporary skilled visas. Over recent years there has been an increasing use of the temporary skilled visa, T457, in this way.

This poses the question as to whether a temporary (4-year) visa can be a successful regional development instrument and to what extent it can leave a development legacy in the targeted non-metropolitan regions. To explore this question we introduce a labour supply theory with extensive migration detail into a multiregional dynamic CGE model, TERM. The model features 15 regions, 7 of them non-metropolitan and a labour supply specification providing a detailed treatment of labour choice behaviour by workers identified by skill class, employment status, industry, region, age group and visa status. The model is parameterised to capture: the underlying transitions between labour categories (such as those between visa categories); and worker preferences regarding choices between occupations and regions of employment.

Our simulations show that regional targeting does generate short-run improvements for the targeted regions in variables which are often used as regional development indicators, such as employment and real GDP. However, labour-market displacement effects ensure that, even in the year of the increased intake, the expansion in the population of the targeted region is significantly below the size of the visa program. This results from a depressing of the targeted region's real wage rate consequent upon the increased regional labour supply, and this in turn causes a reduction in net interregional migration to the targeted region. Over time with an ongoing, though diminishing, impact on net interregional migration and a portion of

[21] The problem of migrants to settle mainly in big cities is by no means unique to Australia. See a review in Hugo and Monren-Alegret 2008.

migrants returning overseas, regional development effects quickly move towards those emanating from an untargeted intake. The policy does, however, result in some increased investment in targeted regions for a few years, with a small residual regional stimulus effect still present after a decade.

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