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DO MIGRANTS CAUSE CURRENT ACCOUNT DEFICITS?

by

P.N. Junankar, David Pope, Cezary A. Kapuscinski and William A. Mudd

Abstract

The aim of this paper is to provide an econometric analysis (using annual time series data) of the links between immigration and exports, imports, and current account balance. One of the main themes we explore is the importance of distinguishing between net migration and arrivals and departures of immigrants. Our main results can be summarised as follows: net migration apparently increases imports, decreases exports and worsens the current account balance. But when we disaggregate immigration into arrivals and departures we find that arrivals, in general, do not have a significant impact on exports, imports or the current account balance. We argue that immigration cannot be used as a policy instrument for fine tuning the current account balance.
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1. INTRODUCTION

Recent years have seen a steadily increasing awareness of the role that immigration plays in Australia's economic, social and political development. There has been a lively debate on the causes and consequences of Australia's growing current account deficits and foreign debt. However, it is not always realised that current account deficits are not a new phenomenon for Australia. Australia has had persistent current account deficits for most of the post-war period, although the merchandise balance has been in surplus for several of those years.

Figure 1: Current account and merchandise trade: balances as a percentage of GDP, 1959-92

Since the nineteen fifties there have been enormous changes in the nature of Australia's immigration program: from a program of peopling Australia by the British, to a diverse multi-ethnic population coming from several European and Asian countries. The nature of our foreign trade also changed: from an almost complete reliance on our colonial links with the "mother country" (Britain) we have now moved our direction of

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1. This paper is based on a larger study done for the Bureau of Immigration and Population Research, see Junankar, Pepe, Kapucinski and Mudd (1994).
2. Until we were "disowned" by the mother country for the European Community.
trade towards the Asia Pacific region. Japan and Korea are now our major trading partners. Another major change in our trade relationships has been the growth of manufacturing exports, replacing our long standing reliance on minerals and rural products. The gradual removal of tariffs and the deregulation of international trade has changed the nature of our trading relationships.

The aim of this paper is to provide an econometric analysis (using annual time series data) of the links between immigration and exports, imports, and current account balance. One of the main themes we explore is the importance of distinguishing between net migration and arrivals and departures of immigrants. Particular attention is paid to the specification of lags, and estimating long run multipliers. In addition, we carry out cointegration tests to explore any long run relationships between the variables of interest. Granger causality tests are provided to look for links between immigration and the current account balance. Finally, we assess the role of immigration policy as a macroeconomic policy instrument in influencing the current account balance.

Our main results can be summarised as follows: net migration apparently increases imports, decreases exports and worsens the current account balance. But when we disaggregate immigration into arrivals and departures we find that arrivals, in general, do not have a significant impact on exports, imports or the current account balance. We argue that immigration cannot be used as a policy instrument for fine tuning the current account balance.

2. IMMIGRATION AND THE CURRENT ACCOUNT BALANCE - A REVIEW

There has been much controversy about the causes of current account deficits and foreign debt and about appropriate macroeconomic policies to tackle the problem. Forsyth (1990) has argued that microeconomic reform cannot influence the current account deficit, Pitchford (1991) has argued that foreign debts if incurred by private agents should not influence government economic policy, and Gregory (1991) in an interesting paper has discussed the merits of the twin deficits theory and cautions against using national income identities to look at current account imbalances and argues that we should focus on the factors that affect exports and imports directly.

An issue of particular concern has been raised recently by Joske (1989) and Argy (1990), who have argued that immigration adversely affects the balance of payments. While they make a number of useful points, we believe that it is necessary to carry out a thorough analysis of this issue.

One of the earliest attempts at an econometric estimation of the impact of immigration on the Australian economy is provided in a paper by Kmenta (1966). Using a simple Keynesian type macroeconometric model with 15 equations and estimated with annual time-series data from 1948 to 1961. He assumes that exports are predetermined and estimates an equation for imports. Net migration is postulated to affect imports via two
channels: firstly it increases aggregate demand (via increased consumption, and immigration induced government expenditure and hence imports), and secondly, it increases investment and hence imports for (presumably) capital goods. His results suggest that real imports depend positively on the lagged change in income, on lagged exports and on net migration.

A recent paper using simple descriptive graphs by Joske (1989), argues that immigration has historically increased aggregate demand and hence increased imports, as well as diverted investment to the housing sector, a non-tradeable sector, thus worsening the balance of payments. Argy (1990) presents the impact of net migration on aggregate demand and supply in an accounting framework, and finds an increase in the current account deficit which peaks with a lag of two years and eventually becoming positive in the long run.

The Centre for International Economics (CIE) (1990) analyse the impact of an increase in immigration on the current account balance in the short, medium and long run using the ORANt model. The impact of immigration on the current account balance is analysed in terms of the effects on the change in the balance between aggregate demand and aggregate supply. If aggregate demand increases by more than aggregate supply, the current account worsens. They analyse the impact of immigration on labour supply (and hence on aggregate supply), on consumption expenditures as well as on induced investment which increases aggregate demand and flows into imported goods. Their results suggest that the impact in the steady state is almost zero, although the time phasing suggests first a deterioration, followed by an improvement in the external sector.

However, the authors (apparently) do not analyse the impact of immigration on the BOP via exchange rate changes in response to unrequited transfers3, which would lead to changes in imports and exports. This is a feature which plays an important role in the Access Economics Murphy Model reported in Ackland (1991).

Ackland (1991) carries out a simulation exercise of halving the immigration intake (ie settler arrivals) in the context of an Access Economics Murphy Model4. This model is distinctive in that it includes rational expectations in the financial sector. A fall in immigration decreases aggregate demand via a decrease in consumption and investment (the latter is very responsive to changes in population). The fall in investment decreases the demand for overseas funds, hence lowering the exchange rate. Further, the fall in unrequited transfers also leads to a lower exchange rate. Because of the assumption of rational expectations, the exchange rate “jumps” and this leads to an improvement in the balance of trade. Imports fall in response to a fall in aggregate demand due to a fall in immigration. The fall in the exchange rate and the import and export price elasticities that are reported seem a little on the high side.

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3 See Appendix Table 1 which gives some idea of the extent of funds transferred by immigrants.
4 See Murphy (1988) for a clear exposition of the structure of the Access Economics Murphy Model.
A more recent use of the AEM Model can be found in Foster (1992) who employs simulation techniques to investigate the effects of alternative migration scenarios. His results are, however, in agreement with the body of accumulated empirical evidence: immigration has little impact on the major macroeconomic variables, including the current account deficit.

There are a few papers which estimate models of the Australian external sector, but ignore the immigration issue, see Tease (1990), Kohli (1983), Feilmingham and Divisekera (1986), and Meer and Heijdra (1990). The international literature has also ignored the impact of immigration on the external sector, see Goldstein and Khan (1985) for an overview.

3. A SIMPLE MODEL OF IMMIGRATION AND THE CURRENT ACCOUNT BALANCE

In this section we provide a framework for analysing the impact of immigration on exports, imports and the current account balance (in the short run and long run).

Figure 2: A Simple Model of Immigration and the Current Account Balance

There are two ways of approaching these questions:

(a) Treat the impact of immigration in a macroeconomic model where there are direct and indirect effects via aggregate demand (AD) and aggregate supply (AS) on the components of the external sector. A simple model where we can analyse the impact of immigration on the balance of payments is provided in Figure 2.
(b) Estimate the impact of immigration on exports, imports, the current account balance directly as quasi-reduced form equations, allowing for any indirect effects via aggregate demand and aggregate supply by the use of appropriate instruments for variables.

The first method requires the estimation of a complete macroeconomic model which allows for all the direct and indirect impacts of immigration. This, although a useful long term goal, would require extensive and long term modelling of the different ways in which immigration would impact on different components of the model, eg the impact on savings, investment, labour supply, wage rates, etc.

The second method adopted here requires the estimation of a sub-sector of the macroeconomic model, in particular we shall estimate import and export equations as well as an equation for the current account balance.

The systems (or macro model approach) implies that immigration would only have an impact on the trade or current account balance if it affects the saving-investment balance or the government budget deficit/surplus. This may be true in an ex post sense (that is in an accounting sense after the transactions have taken place) using the identity:

\[(S - I) + (T - G) = (X - M)\]

where S and I denote Saving and Investment; T and G denote Tax Revenue and Government Expenditure; X and M denote Exports and Imports (all defined in real terms, ie in constant prices).

Immigration may affect saving via changing the age distribution of the population, and hence, in a life-cycle model of saving, lead to changes in aggregate saving. We would expect that since immigration reduces the average age of the population, at least in the short run, aggregate saving would increase. If aggregate investment also increased via government investment and additional private investment, the net effect on \((S - I)\) would be indeterminate. Although the above equation is also an equilibrium condition in a standard macroeconomic model, the variables are then defined in an ex ante sense (ie the variables refer to planned amounts). In this case the equilibrium condition tends to cover up the underlying mechanisms (eg adjustment of interest rates, wages, prices, income, etc.) required to lead to this equilibrium. One of the main empirical problems with this approach is that there are large and variable errors in the measurement of saving and the balance of payments, see Stem (1991).

Direct and Indirect effects

For the purposes of our analysis let us distinguish between the direct and indirect effects of immigration on exports, imports, the trade and the current account balance.
The direct effects are as follows. Immigrants bring in fairly large sums of life-time accumulated funds when they arrive in Australia. These immediately affect the current account balance as unrequited transfers and are likely to influence the exchange rate. Similarly, any remittances by immigrants to their families back home would involve a decrease in the net unrequited transfers. Pensions that are paid by the Australian government or by private firms to returned immigrants would also have a similar effect. Any direct effect on imports by immigrants, eg of special products which they consumed at home would also worsen the trade balance. However, new immigrants spend a very high proportion of their income on housing and transport (so-called nontradeables) which leaves less for imports. In fact, even components of housing and transport may be tradeables and imported from overseas.

The indirect effects include any increase in exports through, say, increased productive efficiency of the more skilled (or more entrepreneurial) immigrants and hence lower costs of production. Similarly, an increase in immigration may (although the evidence is weak) decrease the pressure on wage growth and hence lower costs of production, and hence encourage exports, and deter imports. Immigrants with networks of contacts (and appropriate language and cultural skills) in the source country may help boost exports. Similarly, an increase in tourism (or an increase in enrolment in educational establishments) via friends/family of immigrants would be beneficial for the current account balance.5

4. SPECIFICATION OF THE MODEL

We begin with a simplified version of a model, following Goldstein and Khan (1985), (with time subscripts omitted for simplicity):

\[
M_d = M_d(Y, P_m, P) \quad (1) \\
M_s = M_d\left(P_m, P^*\right) \quad (2) \\
M_s = M_s \quad (3) \\
X_d = X_d(Y^e, P, P^e) \quad (4) \\
X_s = X_s(P, P) \quad (5) \\
X_s = X_s \quad (6) \\
P_m = P^xe \quad (7) \\
P^*_m = P_x/e \quad (8)
\]

5 Any induced investment, either in the private or public sector, would in the first instance increase imports while in the longer run increase production and possibly influence imports and exports. Increases in government expenditure or tax revenues collected from the larger pool of immigrants would have secondary impacts on the current account balance. Similarly, immigration may lead to a diversion of resources from the traded goods sector to the non-traded goods sector, either via relative price changes or via government investment in the non-traded sector. Finally, any increase in aggregate demand or aggregate supply caused by immigration would have an impact on the current account balance. To keep our modelling manageable we focus primarily on the direct effects, and any long run effects are accounted for by the dynamics.
Equations 1, 2, and 3 define import demand, supply, and equilibrium respectively while equations 4, 5, and 6 define export demand, supply and equilibrium respectively. Equations 7 and 8 are definitions that import prices for one country are equal to the export prices of the other country converted into the domestic currency by the exchange rate. Imports and exports are denoted by M and X (with subscripts d and s for demand and supply) respectively, prices are denoted by P with the subscripts m and x denoting import and export prices, and Y stands for GDP. An asterisk denotes world values, and e is the exchange rate. Equations 7 and 8 have to be adapted if we have tariffs or export subsidies.

Our empirical work is based on estimation of the reduced form equations for exports and imports, that is where exports and imports are expressed in terms of variables that are exogenous (determined outside the model). We can illustrate this approach by deriving the equation for exports. Thus, equations 4 and 5 in the full model together with the equilibrium condition (equation 6) lead to reduced form equations for exports and the price of exports. In the equations listed below we have amended the export supply equation 5 slightly to allow supply to be also affected by domestic production, \( \hat{Y} \):

\[
\begin{align*}
\log X &= \phi_0 + \phi_1 \log P_m + \phi_2 \log Y_x + \phi_3 \log P + \phi_4 \log \hat{Y} + \epsilon_i, \\
\log P_l &= \pi_0 + \pi_1 \log P_m + \pi_2 \log Y_x + \pi_3 \log P + \pi_4 \log \hat{Y} + \epsilon_i
\end{align*}
\]

where \( \phi \)'s and \( \pi \)'s are the reduced form coefficients, the \( \epsilon \)'s are the error terms, and time subscripts have been omitted for simplicity. Equation 9 says that exports are determined by world prices and world income \( (P_w \text{ and } Y_w) \), domestic prices \( P \), and by the trend level of domestic output \( \hat{Y} \) which can be related to some exogenous factors \( Z \). In practice, \( Z \) can include the past history of \( Y \) as well as other variables. Equation 10 says that export prices are determined by world prices, world incomes, domestic prices and (trend) domestic GDP. Given that immigration is assumed to impact on \( \hat{Y} \) directly we can, therefore, write an equation for \( \hat{Y} \) as follows:

\[
\log \hat{Y} = \alpha_0 + \alpha_1 \log Z + \alpha_2 \log(\text{immigration}) + \epsilon_i
\]

Substituting for \( \hat{Y} \) in equation 9, leads to the estimable form of the export equation:

\[
\log X = \lambda_0 + \lambda_1 \log P_m + \lambda_2 \log Y_x + \lambda_3 \log P + \lambda_4 \log Z + \lambda_5 \log(\text{immigration}) + \epsilon_i
\]

The variable “immigration” in equation 12 will be substituted by arrivals and departures to allow for a non-symmetric response.

The estimating equation for imports is based on equations 1, 2 and 3. The import demand equation, 1, is amended by allowing immigration to affect import demand. As with the export equation, we shall allow for arrivals and departures to affect import
demand non-symmetrically. We also amend the import supply equation and assume that it is infinitely elastic, i.e. assuming that Australia is a small open economy. In other words we are estimating an import demand function of the form:

$$\log M = \beta_0 + \beta_1 \log Y + \beta_2 \log P^m + \beta_3 P + \beta_4 (\text{immigration}) + \nu$$  \hspace{1cm} (13)

That is, imports are determined by domestic GDP ($Y$), import prices ($P^m$), the domestic price level ($P$), and immigration (which we shall separate into arrivals and departures), and $\nu$ is an error term.

The Current Account Balance equation was estimated in real terms (i.e. deflated by the implicit price deflator for GDP). The estimating equations were of similar form to those listed above for imports and exports. However, because of negative values of the current account balance we estimated it in linear, not log-linear form. The estimating equation is given below:

$$\text{CAB} = \delta_0 + \delta_1 \text{TOT} + \delta_2 \text{ER} + \delta_3 \text{GDP} + \delta_4 (\text{immigration}) + \epsilon$$ \hspace{1cm} (14)

In other words, the current account balance (CAB) depends upon the terms of trade (TOT), the exchange rate (ER), domestic GDP, immigration and $\epsilon$ is the error term.

In order to provide sound econometric estimates of the relationships between immigration and Australia's external account balances the estimation of the postulated regression relationships follows the methodologically superior "general-to-specific" approach (see, for example, McAlister, Pagan & Volker, 1985). Equations 12 and 13 were estimated allowing for flexible lag distributions (up to two lags on each variable, subject to problems of degrees of freedom. The basic principles behind this approach are diagnostic testing of the estimated regressions and simplification of the specification subject to the acceptance of the appropriate restrictions. Such analysis provides statistical rigour for the estimated export and import equations. For the purposes of allowing for testing of the impact of immigration on exports and imports we retained lagged values of immigration even when they were statistically insignificant. In line with the recent advances in the econometric study of the long term relationships between variables, we also employ tests for stationarity and cointegration (see Engle & Granger, 1987). Such tests, in combination with simplification and diagnostic testing of the estimated regressions, also facilitate the derivation and validation of the long-term relationships between immigration and the components of the current account balance. In addition, the dynamic specification of the regressions, when combined with adequate diagnostic testing provides an alternative to the estimation of error correction models.

The design of our analysis of the impact of immigration on exports, imports, and the current account balance introduces a number of advances over previous literature on this subject. Thus, we concentrate on the relationship between the permanent and long-
term immigration and the components of the current account balance. Such a
specification of immigration allows consistent comparison with other recent studies
investigating the impact of immigration on the other aspects of the Australian economy
(see, for example, Junankar and Pope, 1991 for an assessment of the relationship
between immigration and inflation). In addition, we disaggregate net migration into its
component flows (i.e. arrivals and departures). This approach improves on other studies
of immigration and foreign trade such as Kmenta (1966), which used net migration, or
CIE (1990), which analysed only the impact of arrivals.

However, the most important outcome from such disaggregation of the definition of
the net migration variable comes in the assessment of the significance and the strength
of the impact of net migration flows on trade. Thus, we are able not only to provide an
estimate of the short-term impact of the net migration but also compare the relative
strengths of the arrivals and departures and derive their separate long-term impacts.
This analysis is achieved by utilising the concept of multivariate causality or put simply
the impact of one variable (eg arrivals), including all its lags, after account has been
taken of the influence of other variables (such as GDP, relative prices, etc) on the
variable of interest (say) total exports. The implementation of these tests of causal links
is based on Granger's (1969) test of causality. In simple terms, if lagged values of
arrivals (departures) help to explain (in a statistical sense) exports, imports, or the
current account balance then arrivals (departures) are said to Granger cause exports,
imports, or the current account balance.

5. SOME ECONOMETRIC RESULTS

All models have been originally specified in dynamic form to allow for various lags (eg
immigrants' impact on the required transfers component of the balance of payments
may involve lags due to administrative lags or delays in changing immigrants' assets
into liquid form). There may be decision lags, administrative lags, lags due to
expectations about (say) prices, delivery lags for (say) imported capital goods, etc.

In line with other studies dealing with estimation of reduced form models, we have
employed ordinary least squares techniques to estimate the regressions. The equations
are estimated only with exogenous and predetermined variables on the right hand side,
so that we need not use instrumental variables estimation methods.

We begin with the export equation. Preliminary tests for stationarity of the relevant
variables (tests for unit roots) have shown that all variables are integrated of order one
except the exchange rate which was stationary (ie I(0)). Hence the export equation can
be estimated with all the regressors in level forms. The final equation (estimated in log-
linear form) together with its diagnostics is presented in Table 4.1. This final
specification includes an exchange rate variable which is a spliced index of the
exchange rate between the UK and Australia and the trade weighted index of exchange
rates (TWI) which is available only from 1970 onwards. In addition, the equation also
contains an index of the world output. This variable is based on the Summers and Heston (1991) purchasing power parity estimates of output. We have selected the major economies which are also Australia’s main trading partners as the components of this constructed world output. These countries are as follows: Japan, United Kingdom, United States, Germany, France, New Zealand and South Korea. The availability of this variable also constrains the estimation period to end in 1988.

Table 1: Exports equation

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-8.21</td>
<td>-3.81</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Exports (t-1)</td>
<td>-0.0396</td>
<td>-0.27</td>
<td>[0.79]</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>-0.005</td>
<td>-3.78</td>
<td>[0.00]</td>
</tr>
<tr>
<td>World price</td>
<td>0.17</td>
<td>0.73</td>
<td>[0.47]</td>
</tr>
<tr>
<td>World GDP</td>
<td>-0.11</td>
<td>-1.13</td>
<td>[0.27]</td>
</tr>
<tr>
<td>Prices (t-1)</td>
<td>-0.31</td>
<td>-1.26</td>
<td>[0.22]</td>
</tr>
<tr>
<td>GDP (t-1)</td>
<td>1.41</td>
<td>3.96</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Arrivals (t-1)</td>
<td>-0.15</td>
<td>-1.73</td>
<td>[0.10]</td>
</tr>
<tr>
<td>Arrivals (t-2)</td>
<td>0.10</td>
<td>1.27</td>
<td>[0.21]</td>
</tr>
<tr>
<td>Departures (t-1)</td>
<td>0.39</td>
<td>3.21</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Departures (t-2)</td>
<td>-0.25</td>
<td>-1.68</td>
<td>[0.10]</td>
</tr>
<tr>
<td>R-Bar-Squared</td>
<td></td>
<td></td>
<td>0.99</td>
</tr>
<tr>
<td>DW-statistic</td>
<td></td>
<td></td>
<td>2.37</td>
</tr>
</tbody>
</table>

Notes: 1. All variables are in as natural logarithms, except the exchange rate.

2. “Prob.” indicates the significance level of the estimated coefficients.

3. Detailed diagnostics are reported in the Technical Appendix, which is available on request.

The equation performs adequately in terms of the usual diagnostic tests although there appears to be some serial correlation. The regressors in the final specification perform, in general, according to expectations. The results suggest that an increase in domestic GDP leads to an increase in exports, the higher domestic prices the lower exports (although not statistically significant), and a higher exchange rate reduces exports. However, world income appears with a negative sign, though well outside the traditional significance levels. The world price variable, an index of the world prices, does not seem to influence exports significantly.

When we look at the impact of immigration, we find that arrivals affect exports negatively, while departures affect them positively at first and then negatively.
However, arrivals are not statistically significant while only the first lag of departures is very significant.

Turning to the causal impact of immigration variables on Australia's exports we find that departures are more significant than arrivals. Multivariate tests of causality show that there is a very strong direct impact of departures on exports, but only mildly significant impact of arrivals. In addition, net migration makes a highly significant impact on exports. These results can be rationalised by realising that an increase in arrivals leads, at least in the short to medium term, to a diversion of domestic production onto the domestic market at the expense of the export markets. On the other hand, an increase in departures reduces the domestic demand making some production available for exports.

Next let us consider the long term effects of immigration on exports. Here we consider the impact of an initial increase in (say) arrivals of one per cent, assuming no change in all the other variables, on exports in long run equilibrium.

Table 2: Exports: Selected long-run elasticities

<table>
<thead>
<tr>
<th></th>
<th>Long-run elasticities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrivals</td>
<td>-0.24*</td>
</tr>
<tr>
<td>Departures</td>
<td>0.13</td>
</tr>
<tr>
<td>Net Migration</td>
<td>-0.37**</td>
</tr>
<tr>
<td>GDP</td>
<td>1.34**</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>-0.005**</td>
</tr>
</tbody>
</table>

Notes: One asterisk denotes significance at 5 per cent level, two asterisks denote significance at 1 per cent level.

It is also interesting to note that among the calculated long-run multipliers for migration variables (see Table 2 above), only net migration is significant at better than 1 per cent level. GDP and the exchange rate are also very significant.

The next specification estimated with annual data is the import equation. As discussed above, the basic specification of the reduced form was derived assuming a small open economy engaged in trade in markets clearing at all times. Similarly to the export equation, this equation was estimated in log-linear form and in real terms. The final specification of this equation appears in Table 3 below.

This regression appears acceptable in terms of the usual diagnostic tests: in particular, there was no evidence of serial correlation, heteroscedasticity or non-normality of residuals. The functional form of the regression could not be rejected. Additional tests for a unit root in the residuals, together with our earlier tests of stationarity of the
individual regressors, suggest uniform stationarity properties of the relevant variables and no non-stationarity in the regression residuals.

### Table 3: Imports equation

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.96</td>
<td>0.42</td>
<td>0.68</td>
</tr>
<tr>
<td>Relative price (t-1)</td>
<td>-0.71</td>
<td>-1.95</td>
<td>0.08</td>
</tr>
<tr>
<td>Relative price (t-2)</td>
<td>0.48</td>
<td>1.07</td>
<td>0.31</td>
</tr>
<tr>
<td>GDP (t-1)</td>
<td>2.20</td>
<td>2.51</td>
<td>0.03</td>
</tr>
<tr>
<td>GDP (t-2)</td>
<td>-1.44</td>
<td>-1.60</td>
<td>0.14</td>
</tr>
<tr>
<td>Arrivals (t-1)</td>
<td>-0.04</td>
<td>-0.31</td>
<td>0.76</td>
</tr>
<tr>
<td>Arrivals (t-2)</td>
<td>0.22</td>
<td>1.06</td>
<td>0.31</td>
</tr>
<tr>
<td>Departures (t-1)</td>
<td>-0.66</td>
<td>-2.48</td>
<td>0.03</td>
</tr>
<tr>
<td>Departures (t-2)</td>
<td>0.24</td>
<td>1.17</td>
<td>0.26</td>
</tr>
<tr>
<td>Effective protection rates</td>
<td>-0.62</td>
<td>-2.70</td>
<td>0.02</td>
</tr>
<tr>
<td>R-Var-Squared</td>
<td>0.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW-statistic</td>
<td>2.49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: As for Table 1.

The variables are estimated with the expected signs although not all individual lags are significant. The price of imports relative to the general price level in Australia has a negative (one year lag) and then positive (two year lag) effect on imports. Real GDP appears first to increase imports with a subsequent negative impact. It is also interesting to note that an index of the effective protection, provided by the Industry Commission, was significant in the import equation indicating that the issues specific to Australia’s foreign trade (such as the changing balance between the quantitative restrictions and tariffs) need further investigation.

Turning now to the impact of immigration on imports (see Table 3 above) there appears to be a dichotomy between the arrivals and departures. Thus, none of the lags on arrivals is estimated with a significant t-ratio. On the other hand, departures fare much better and come out with much more significant coefficients. On balance (ignoring the problems of insignificant coefficients) arrivals appear to increase imports while departures decrease imports.

The multivariate causality tests confirm these differences. Arrivals do not significantly "cause" imports while departures on their own are significantly affecting imports with

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6 This variable was available for the period 1969 to 1990, which constrains the starting point of our estimation period.
the joint test of all lags being significant at less than ten per cent level. Net migration is also significant.

The calculated long-run multipliers (see Table 4) tell the same story with arrivals not significant, departures exerting a strong negative impact on imports and the net migration having a positive but mildly significant (at 6 per cent level) impact. The long run price elasticity is -0.3 and the long run impact of GDP is positive and just below unity. These elasticities are not dissimilar to those reported in Horton and Wilkinson (1989) and Wilkinson (1992).

Table 4: Imports: Selected long run elasticities

<table>
<thead>
<tr>
<th></th>
<th>Long-run elasticities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrivals</td>
<td>0.17</td>
</tr>
<tr>
<td>Departures</td>
<td>-0.43*</td>
</tr>
<tr>
<td>Net migration</td>
<td>0.60*</td>
</tr>
<tr>
<td>GDP</td>
<td>0.77**</td>
</tr>
</tbody>
</table>

Notes: One asterisk denotes significance at 5 per cent level, two asterisks denote significance at 1 per cent level.

Table 5: Current account balance equation

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>T-Ratio</th>
<th>[Prob]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>8992.01</td>
<td>0.09</td>
<td>[0.28]</td>
</tr>
<tr>
<td>Terms of trade</td>
<td>137.19</td>
<td>0.84</td>
<td>[0.01]</td>
</tr>
<tr>
<td>Terms of trade (t-1)</td>
<td>-177.39</td>
<td>-2.49</td>
<td>[0.02]</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>-78.09</td>
<td>-1.33</td>
<td>[0.19]</td>
</tr>
<tr>
<td>GDP(t-1)</td>
<td>-0.085</td>
<td>-3.53</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Arrivals (t-1)</td>
<td>-0.029</td>
<td>-2.00</td>
<td>[0.06]</td>
</tr>
<tr>
<td>Arrivals (t-2)</td>
<td>0.030</td>
<td>0.53</td>
<td>[0.14]</td>
</tr>
<tr>
<td>Departures (t-1)</td>
<td>0.069</td>
<td>0.11</td>
<td>[0.28]</td>
</tr>
<tr>
<td>Departures (t-2)</td>
<td>-0.019</td>
<td>-0.32</td>
<td>[0.75]</td>
</tr>
<tr>
<td>Deregulation dummy</td>
<td>-3607.1</td>
<td>-2.32</td>
<td>[0.03]</td>
</tr>
<tr>
<td>R-Bar-Squared</td>
<td></td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>DW-statistic</td>
<td></td>
<td>1.91</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. All variables are in levels.
2. "Prob." indicates the significance level of the estimated coefficients.
3. Detailed diagnostics are available on request.
The last specification estimated with annual data is the equation for the current account balance, equation 14 above. This equation has been estimated in linear form with the current account balance deflated by the implicit price deflator for the GDP. As the current account balance contains negative values so that we cannot take logarithms. In the general specification, we have again allowed for up to two lags on each variable. The final specification is presented in Table 5 above.

This equation appears acceptable in terms of its statistical properties. The regressors explain a reasonable proportion of the variations in the current account balance with no evidence of residual serial correlation, heteroscedasticity and non-normality. In addition, the general test for functional form suggests an appropriate specification of the regression while a unit root test on the residuals indicates stationary regression residuals.

The non-immigration regressors are all statistically significant except for the exchange rate variable. The terms of trade variable has a positive immediate effect and a smaller, in absolute value, lagged effect. The income variable appears with the expected negative sign. It is also worth mentioning that our constructed world GDP appears to be very closely correlated with the domestic GDP making a regression with the two income variables inferior to the final specification. The significance of the financial deregulation dummy suggests that the deregulation in the financial markets, including the foreign exchange markets, may have had a once only negative effect on the current account balance.

When we turn to the immigration variables we see that only the first lag on arrivals is significant, while departures are not significant. However, a variable deletion test for all immigration variables is rejected at better than 1 per cent significance level. Separate testing of the two flows of migration indicates that arrivals are not important in directly influencing the current account while departures fare slightly better.

It is interesting, however, to look at the long-run multipliers associated with the migration variables (see Table 6).

Table 6: Current Account Balance: Selected long-run multipliers

<table>
<thead>
<tr>
<th></th>
<th>Long-run multipliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrivals</td>
<td>0.001</td>
</tr>
<tr>
<td>Departures</td>
<td>0.05*</td>
</tr>
<tr>
<td>Net migration</td>
<td>-0.05</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.08**</td>
</tr>
</tbody>
</table>

Notes: One asterisk denotes significance at 5 per cent level, two asterisks denote significance at 1 per cent level.
Thus, the long-run impact of arrivals is about an order of magnitude smaller (in absolute magnitude) than either the effect of departures or the net migration. In addition, only the departures appear to exert any significant long-run effect on the current account balance.

Finally, we have also performed simple simulation experiments with the estimated equations for exports and imports. The simulations are structured around a sustained decrease of arrivals of ten thousand persons per annum and an equal amount increase in departures which corresponds to an average 6 per cent fall of arrivals and 14 per cent increase of departures over our sample period. Thus, we assume a sustained lower level of net migration of twenty thousand persons per annum. This compares with net annual migration over the last four decades of over 86 thousand. The outcomes of our simulations are presented in Figures 1 and 2 for exports and imports, respectively. In general, the results suggest relatively little change in exports and some sustained decrease in imports. In addition, the reduction in net migration seems to even out the cyclical variations in foreign trade.

Figure 3: Actual and simulated exports
6. CONCLUSIONS

Summary of empirical results.

Let us briefly summarise our main results. If we focus on the long run results we can see that net migration decreases exports, increases imports and it leaves the current account balance unaffected. However, immigrant arrivals decrease exports, have no impact on imports, or the current account balance. On the other hand, departures have no impact on exports, decrease imports, and improve the current account balance. These results are summarised below in Table 7.

Table 7: Summary of the impact of immigration on current account: long-run multipliers.

<table>
<thead>
<tr>
<th></th>
<th>Long-run multipliers</th>
<th></th>
<th>CAB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>imports</td>
<td></td>
</tr>
<tr>
<td>Arrivals</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Departures</td>
<td>0</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Net migration</td>
<td>-</td>
<td>+</td>
<td>0</td>
</tr>
</tbody>
</table>
Notes: A zero indicates no significant impact in the long-run, while a plus sign indicates a significant increase, while a negative sign indicates a significant decrease.

In other words, our research strategy which involved disaggregating net migration into arrivals and departures gives us significantly different results from those found in earlier studies. In particular, our result that arrivals do not significantly affect imports, exports, or the current account balance has significant implications for policy which we discuss below.

Policy implications

What are the implications of our research for whether immigration policy can be used to influence the current account balance? Without entering the much larger issue of whether the current account balance should be a target of policy in a deregulated economy, see Pitchford (1991), we note that immigration policy would not rate in the first rank of instruments. There are clearly other instruments of policy which would come to mind first. However, our research suggests that even if we wished to target the current account balance, immigration policy would not be a sensible instrument. This is for two reasons: firstly, immigration has aggregate supply and aggregate demand effects which make it difficult to judge its net impact on the economy and hence on the current account balance. Secondly, our research suggests that the current account balance does not respond symmetrically to arrivals and departures. Although net immigration has a statistically significant impact on imports, exports, and the current account balance, arrivals are not statistically significant. Since policy has some control over arrivals, but very little over departures, it is a very imperfect instrument. Policy may set targets for new arrivals but actual arrivals seem to be endogenously determined by the stage of the business cycle, falling during recessions and rising in upturns.

To conclude, our results suggest that immigration does not play an important role in determining the current account balance. Even if we wished to target the current account balance, we argue that immigration should not be used as an instrument as a government has little control over departures and inadequate control over arrivals.
REFERENCES


# APPENDIX

Appendix Table 1: Potential funds brought into Australia by immigration category, financial years 1983-84 to 1988-89

($A million)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business migration</td>
<td>135.7</td>
<td>161.9</td>
<td>241.9</td>
<td>509.9</td>
<td>1026.2</td>
<td>1541.6</td>
</tr>
<tr>
<td>Other economic</td>
<td>112.1</td>
<td>109.5</td>
<td>207.7</td>
<td>325.8</td>
<td>322.6</td>
<td>561.1</td>
</tr>
<tr>
<td>Family</td>
<td>258.8</td>
<td>259.0</td>
<td>388.4</td>
<td>546.0</td>
<td>727.0</td>
<td>920.5</td>
</tr>
<tr>
<td>Conventional migration</td>
<td>164.1</td>
<td>213.2</td>
<td>390.4</td>
<td>560.0</td>
<td>993.0</td>
<td>962.8</td>
</tr>
<tr>
<td>Refugee and SHPI</td>
<td>7.0</td>
<td>5.2</td>
<td>6.5</td>
<td>3.7</td>
<td>3.3</td>
<td>7.5</td>
</tr>
<tr>
<td>Other</td>
<td>36.4</td>
<td>38.4</td>
<td>67.9</td>
<td>142.8</td>
<td>244.2</td>
<td>310.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>714.1</strong></td>
<td><strong>787.2</strong></td>
<td><strong>1302.8</strong></td>
<td><strong>2088.6</strong></td>
<td><strong>3317.0</strong></td>
<td><strong>4303.2</strong></td>
</tr>
</tbody>
</table>

Note: 1. Special Humanitarian Program

DATA APPENDIX

Annual data

I. Dependent variables

   Source: (1).

   Source: (1).

   Source: (1)

II. Independent Variables

1. Output/income

GDP Log of GDP at 1985 prices
   Source: (1)

World GDP Log of trade weighted world GDP, 1985=100.
Source: (3).

2. Prices

Price: Log of GDP divided by GDP at 1985 prices
   Source: (1).

World price: Log of trade weighted world consumer price index, 1985=100.
Source: (3).

Relative price of imports: Log of import price index divided by (GDP/GDP at
   1985 prices)
Source: (3).

3. Immigration variables

Arrivals: Log of permanent and long-term arrivals.
   Source: (2).

Departures: Log of Permanent and Long-term departures.
   Source: (2).
4. Miscellaneous

Terms of trade: Log of terms of trade of goods and services.
Source: (1).

Effective protection: Log of effective rates of protection (percentage).
Source: (1).

Note: 'Log' means natural logarithm.

Sources for annual data set


(2) Aggregate of quarterly data by financial years.

(3) Estimates for seven countries: Japan, United Kingdom, United States, Germany, France, New Zealand and South Korea from Summers, R. and Heston, A. 1991, 'The Penn World Table (Mark 5): An Expanded Set of International Comparisons', 1950-1988, Quarterly Journal of Economics, 106 (2), May, pp. 327-368. Weighted by percentage of exports in total exports to the seven, from ABS, Annual Summary Tables, (Cat. No. 5424.0; various issues), ABS, Canberra.
## Diagnostic Tests

Table 1: Exports equation: annual data

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ (1) = 3.4010 [1.065]</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ (1) = .24876 [1.618]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ (2) = .79085 [1.673]</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ (1) = 2.8136 [0.994]</td>
</tr>
</tbody>
</table>

Table 3: Imports equation: annual data

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ (1) = 2.2871 [1.311]</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ (1) = .69238 [1.405]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ (2) = .77043 [1.680]</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ (1) = .02413 [0.976]</td>
</tr>
</tbody>
</table>

Table 5: Current account balance equation: annual data

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Serial Correlation</td>
<td>CHI-SQ (1) = .002556 [0.960]</td>
</tr>
<tr>
<td>B: Functional Form</td>
<td>CHI-SQ (1) = .32534 [1.568]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>CHI-SQ (2) = .46456 [1.793]</td>
</tr>
<tr>
<td>D: Heteroscedasticity</td>
<td>CHI-SQ (1) = .05656 [1.812]</td>
</tr>
<tr>
<td>E: Predictive Failure</td>
<td>CHI-SQ (1) = 1.025 [1.311]</td>
</tr>
</tbody>
</table>

A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET Test using the square of serial correlation
C: Based on a test of skewness and kurtosis of the residuals
D: Based on the regression of squared residuals or residuals
E: A test of adequacy of predictions (Chow's test on squared fitted values)
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