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Chapman, Bruce;Cobb-Clark, Deborah
Economic Record; Dec 1999; 75, 231; ProQuest
pg. 358
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THE ECONOMIC RECORD, VOL. 75, NO. 231, DECEMBER 1999, 358–368

A Comparative Static Model of the Relationship between Immigration and the Short-Run Job Prospects of Unemployed Residents

BRUCE CHAPMAN*
Centre for Economic Policy Research, Research School of Social Sciences, Australian National University

DEBORAH COBB-CLARK
Economics Program, Research School of Social Sciences and National Centre for Development Studies, Australian National University

A novel theoretical approach is developed to illustrate the consequences of immigration for the probability that unemployed residents gain a job. Through the use of the vacancies to unemployment ratio it is shown that immigration in theory can either increase or decrease unemployed residents' employment probabilities, but that, contrary to populist rhetoric, an increase is more likely the more recessed is the labour market. With reference to feasible Australian values of the parameters of interest, it is demonstrated that in practically all circumstances immigration increases the overall employment prospects of unemployed residents. Even so, the analysis is very short run, and strong conclusions as to what might be happening over the longer term are not appropriate.

I Introduction

Policy commentators and workers themselves often suggest that, by adding to labour supply, immigration necessarily leads to additional unemployment or wage decreases for resident workers. Many Australian experts have noted that these concerns can give rise to anti-immigration sentiment which may run higher during economic downturns than during economic expansions (Harrison 1984, Wooden *et al.* 1994).

Much of the research in this area considers the broad question of whether or not immigration increases aggregate unemployment. While this is a perfectly valid issue often motivated by concerns related to welfare expenditure, the question addressed in this paper has a more specific focus: what does immigration mean for the job prospects of already unemployed residents? This matter is raised in parts of the immigration/unemployment literature, but the approach adopted here has not been used apart from in the earlier modelling

* The authors are grateful to Tony Salvage for excellent research assistance, to Catherine Baird and Stephanie Hancock for production assistance, and to Neville Norman who helped in the development of the original economic model which forms the basis of this paper. Craig Riddell, John Pitchford and two referees offered useful comments on an earlier draft, as did participants at the 1997 Canadian Employment Research Forum, Vancouver, and at a seminar delivered to the Research School of Social Sciences at the ANU. The Department of Immigration and Multicultural Affairs and the Reserve Bank of Australia provided useful data. All errors are the responsibility of the authors.

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attempts which are the genesis of the current exercise (Chapman, Pope and Withers 1985, Chapman and Norman 1985).

The analysis explores the following comparative static question: how does immigration influence the probability of an unemployed resident finding employment? In addressing this question we consider employment probabilities in the absence of immigration and compare this to the case where immigration is allowed to occur. The modelling is highly stylized, and the focus is on the comparative statics. The underlying policy motive for the exercise can be clarified through consideration of the following.

It is obvious that higher levels of immigration increase job competition, and so decrease the employment prospects of unemployed residents. But, and this is a critical point, immigrant spending from past savings will increase the demand for labour and create job vacancies. It follows that the question of how immigration affects the labour market opportunities of resident workers is an empirical one.

A major result of this exercise is that the state of the labour market is fundamental to conclusions concerning the likely impact of immigration on the job prospects of unemployed residents. However, the conclusion to be drawn is precisely the opposite to that promoted in populist discussion: specifically, if the only goal is to increase the chances of an unemployed resident gaining employment, immigration is more likely to achieve this the more recessed is the labour market. In a sense, immigration can act as an automatic stabilizer for resident unemployment.

The modelling adopted in the paper is unusual in that the focus is not on changes to unemployment rates from immigration, but instead reflects sympathy for the perspective promoted by Hansen (1993, 233) that '... an economically rational immigration policy should be based on vacancy data rather than labour shortage, surplus, or unemployment data'. Consistent with that view, this paper uses vacancy and unemployment relationships in both conceptual and empirical contexts.

That is, we consider the issue through reference to the extent to which the existing vacancy to unemployment rate is changed with immigration. While this approach has not received much attention in the literature, we believe that there are considerable benefits from using the methodology in other studies.

The theoretical approach begins with the assumption that there are two types of labour, defined in terms of skill, allowing us to explore the consequences of immigration for the job prospects of workers with different skills. The impact of immigration on job prospects is shown to depend on both the composition of immigrant expenditure and the skill characteristics of the immigrant pool.

The theoretical model is then simplified so that we can use existing data to empirically illustrate the likely outcomes of immigration for unemployed residents' employment probabilities. Using ranges of Australian data for the parameters of interest and the average vacancy to unemployment rate for 1978 to 1997, it appears that immigration has almost certainly increased the short-term employment probability of unemployed Australian residents. Indeed, it seems that the economic conditions under which immigration *does not* improve unemployed residents' job prospects are very improbable.

Thus, the model and the evidence are strongly consistent with two propositions concerning the effect of immigration on the employment prospects of unemployed residents. The first is that, in general, they are improved. The second is that the extent of this improvement is greater the more recessed is the economy.

II The Immigration and Unemployment Literature

Immigration researchers have expended a great deal of effort addressing questions related to the immigration and unemployment nexus for a variety of countries and over many different periods. What now follows is a brief review of the main findings with particular reference to Australian, US and Canadian research, since these are the major immigrant receiving nations.

Harrison (1984), for example, examines the impact of newly arrived immigrants on the South Australian labour market over a period—1976 to 1981—when the South Australian economy was depressed relative to most other Australian States. While information about the number of jobs held by recent immigrants is readily available, Harrison lacked direct information about the effect of immigration on labour demand. Making the assumption that the increase in labour demand was the same as the proportionate increase in the workforce, he concludes that immigrants added more jobs to the South Australian economy than they themselves filled. Thus, in this exercise, immigration was responsible for expanding rather

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than reducing the job opportunities of natives and established migrants.

Other Australian researchers have analyzed aggregate post-war time-series data for Australia to test for Granger causality between net migration and the change in unemployment (Chapman, Pope and Withers 1985, Withers and Pope 1985, Pope and Withers 1993). Essentially, the method involves estimating two non-structural equations, one for net migration and one for the change in the unemployment rate.[1] Lagged values of net migration are included as dependent variables in the unemployment equation and vice versa.

Net migration is said to 'Granger cause' unemployment whenever the change in the unemployment rate is predicted better using a model with lagged net migration than it is without (Withers and Pope 1985). Failing to find any evidence that net migration 'causes' unemployment, the authors conclude that the hypothesis that net migration has no effect on unemployment must be accepted. These conclusions also hold when unemployment and migration data extending back to 1860 are analyzed (Pope and Withers 1993). In fact, the authors present some evidence that in the 20th century higher levels of net migration may have actually reduced unemployment, although the data in the pre-World War I period are particularly weak. The results of analyses of this type should not be accepted uncritically, one reason being that changes over time in net immigration levels relative to the size of the labour force seem to be too small to allow confident conclusions as to their precise affect on aggregate unemployment.

Canadian researchers have also explored the link between immigration and unemployment. Much of this literature is based on the results of econometric models of the Canadian economy which have been extended to include immigration. Unfortunately, the results of this research are often difficult to assess because they depend in part on the assumptions made when incorporating immigration into the model.[2] In particular, whether immigrants are associated with higher or lower levels of unemployment seems to depend in part on whether the model includes the effect of immigration on the demand for goods and services as well as on the labour market itself (Marr and Siklos 1994).

Taking a different approach, Samuel and Conyers (1987) estimate the effect of Canadian immigration in 1983 to 1985 on the supply of and demand for labour. In their so-called 'balance sheet' approach, the authors use information about the level of immigration and aggregate labour market participation rates among immigrants to calculate the extent to which labour supply was increased over the period. They then calculate the labour demand effect of immigration by separating the flow of immigrants into the business category and others.

Using longitudinal information about the number of jobs created by a previous cohort of business migrants, the authors conclude that business migrants to Canada in the period 1983 to 1985 would have been expected to create 24 000 new jobs. The authors then use information about the consumption pattern of other immigrants and the amount of capital they brought with them to Canada to estimate the effect of immigrant spending on additional job creation. Overall, the authors conclude it is likely that the 1983 to 1985 immigrant cohort added more jobs to the Canadian economy than they took.

Marr and Siklos (1994) also consider the joint relationship between immigration and unemployment in Canada. Using quarterly data for 1962 to 1990, the authors utilize time-series methods that allow current unemployment to be jointly determined by past, current, and future immigration. While providing information about the effect of immigration on current unemployment, their approach also allows the authors to test whether the data are consistent with a model in which current unemployment influences future immigration.

The authors conclude that while over the period 1962 to 1978 immigration is not statistically linked to current unemployment, over the 1978 to 1985 time period past immigration and current unemployment were positively related. This latter result appears to be at variance with much of the previous evidence, although some reconciliation of this might lie in the distinction between short-run effects and the longer term implications of immigration for the positioning of the non-accelerating inflation rate of unemployment (NAIRU). This point is considered further in Section III.

Much of the US literature on the impact of immigration on the labour market outcomes of native workers has focused on wage rate changes

[1] The change in unemployment—rather than the unemployment rate itself—is modelled so that the flow of migrants can be compared to the flow of workers into unemployment.

[2] See Samuel and Conyers (1987) or Marr and Siklos (1994) for a review of this literature.

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rather than employment or unemployment. However, Altonji and Card (1991) use a simple theoretical model of the labour market for skilled and unskilled labour—in which immigrants add both to labour supply and labour demand—to assess the impact of immigration on the employment of less-skilled native workers.

Using data for 120 metropolitan areas from the 1970 and 1980 US Censuses, they conclude that there is little evidence that changes in the level of immigration are associated with large or systematic changes in the employment or unemployment of less skilled natives. While immigration does appear to have some negative effect on the wage rates of natives, the magnitude of this effect is sensitive to the specification and estimation procedure used.[3] In all cases the effects are small.

Overall, the almost consistent result is that for Australia, Canada, and the United States higher levels of immigration have not been associated with higher levels of unemployment.[4] This conclusion is striking because not only is it reached using data for different countries, but it also holds across many time periods and using a variety of statistical techniques. It is also notable that the conclusion runs counter to that assumed in the simplistic arguments used by many engaged in the immigration policy debate. This divergence probably occurs because individuals often do not recognize that while immigrants increase job competition, they also increase employment through the expenditure of financial assets brought into the country.

It is important at this point to note a few caveats about the general conclusion. First, the research reported above focuses on the link between immigration generally and aggregate unemployment. It does not follow that immigrants never have negative effects on the employment or wages of specific labour market groups. Indeed, there is evidence to suggest that immigration can worsen the labour market opportunities of specific groups (De Voretz 1989).

[3] Hatzius (1994) reaches a similar conclusion for Germany. Immigrants in that country do not appear to affect native employment. While immigrants do appear to affect the wages of native workers, the direction of the effect depends on the group in question: foreign immigrants lower, and East German immigrants raise, native earnings.

[4] The results of Marr and Siklos (1994) are an exception to this, suggesting that for Canada immigration may have resulted in higher levels of unemployment over part of the time period studied.

Second, most studies do not consider whether specific groups of immigrants (with reference for example, to country of origin, or age categories) affect the employment opportunities of natives differently,[5] though it should be clear that the composition of the immigrant flow must matter in determining its overall effect. For example, an immigrant group made up of a high proportion of those wanting to participate in the labour force and bringing in few financial resources must have vastly different consequences for employment and unemployment than an immigrant group made up of wealthy labour market non-participants. These compositional issues are likely to be of great significance and are touched on further below.

Third, it is worth noting that the conclusion that previous immigration does not cause unemployment does not imply that the reverse is true. Much of this literature does in fact find that for Canada and Australia high levels of past unemployment are associated with lower levels of current immigration (for example, Marr 1973, Green 1976, Withers and Pope 1985, Marr and Siklos 1994).[6] This relationship appears to stem in part from the tendency of governments to reduce overall levels of immigration when domestic unemployment is high, as well as from the likelihood that relatively high unemployment decreases the attractiveness of a country as a destination (Cobb-Clark and Connolly 1997).

Finally, there is little in the literature which adequately distinguishes issues pertinent to the dynamics or time frame—that is, short versus medium versus long run—of immigrants' impact on the labour market. As explained in the discussion following, it is critical to be precise about the periodicity of the potential immigrant/unemployment nexus. Conclusions reached on the basis of a given time frame might well be compromised for shorter or longer periods of analysis.

III The Current Inquiry in Context

Unlike much of the previous literature, our question is more specifically concerned with the effects of immigration on unemployed residents' job prospects, rather than the extent to which immigration increases the unemployment rate. One justification of the narrower focus is that much of the political disquiet concerning immigration seems to be about the consequences of

[5] Hatzuis (1994) is an exception to this.

[6] Withers and Pope (1985) note that this relationship appears to hold in other countries as well (see footnote 2).

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immigration for unemployed (or prospectively unemployed) residents. In this case, research analyzing the impact of immigration on the overall level of unemployment is not helpful because immigration can simultaneously increase unemployment *and* improve the job prospects of unemployed residents. This possibility would be reflected in relatively high unemployment rates for immigrants immediately following their arrival, which is undoubtedly the case.[7]

Our focus is on a comparative static, rather than dynamic, model of immigration. This is a possible limitation of this study because the analysis does not necessarily assist in an understanding of how current immigration policy will impact on the labour market over time. This is because the composition and size of the immigration flow will have implications for infrastructure investment, and government expenditure and tax revenue, which must eventually matter for job growth. Further, if immigrants arriving in a recession have a relatively high probability of experiencing long spells of unemployment, immigration could add to structural mismatch in the labour market affecting the NAIRU.[8]

As a result, some of the conclusions derived from a model cannot be generalized to the longer run, and this matters for policy. However, the major advantage of our comparative static approach is that it allows us to use actual Australian values of the variables of interest to generate results. A more complicated dynamic model cannot be tested using existing data.

Finally, our approach differs from much of the US literature because our modelling emphasizes quantity (i.e. employment) rather than wage adjustments from immigration. Increases in the supply of labour as a result of immigration could decrease wages and thus concomitantly increase resident employment, a prospect we have ignored because our analysis is inherently short run. This implies that the presumption of some wage rigidity is plausible. Short-term wage rigidities can be understood to be reflections of the power of 'insiders' relative to 'outsiders', or could have an institutional or even a legal basis as they do to a relatively high degree in Australia.[9]

[7] For Australia this is clearly the case (Chapman and Miller 1985, Beggs and Chapman 1990).

[8] See Chapman (1994).

[9] The Australian award wage system and the extent of union coverage and influence imply that in the short run, the assumption of wage rigidity is plausible.

Still, for different countries and at different points in time there will be varying degrees of wage adjustment from immigration, and this will also impact on resident employment prospects. Given the significant differences between countries in wage setting institutions it is inappropriate to generalize the current findings.

IV Modelling the Effect of Immigration on the Employment Prospects of Unemployed Residents

Our model compares the probability of an unemployed resident finding employment when there is no immigration to that when immigration occurs. We assume that workers are either skilled or unskilled, and that there is immobility between these sectors. Further, we assume that the number of vacancies is less than the number of unemployed residents,[10] and that there is no ongoing structural mismatch so that unemployed workers are able to fill current vacancies.[11]

Apart from the consequences of immigrant expenditure, no allowance is made for vacancy creation over time, nor is any attention paid to the fact that with time there will be additions to the unemployment pool, from layoffs and new entrants to the labour market. Additionally, it is assumed that immigrant and resident search efficiency are equivalent.[12]

The essence of the model is that an unemployed resident of a particular skill type has a probability of being employed which is a function of two things: the number of unfilled vacancies of that skill type; and the number of unemployed people competing for jobs in that skill area.

Formally, the model is as follows. We compare the case where there is no immigration (denoted by 0) with the case of immigration (denoted by 1). In the absence of immigration the number of

[10] The aggregate data presented in Section VI strongly support this assumption.

[11] If the length of the period is sufficiently short the filling of all the original vacancies by the initial stock of the unemployed is equivalent to suggesting that there is no on-going structural mismatch in the labour market.

[12] The implications of this assumption are complex, but the bottom line is that because of their lack of familiarity with the Australian labour market, immigrants are probably less search efficient than residents. If this is true it implies that the essential results are conservative. On the other hand, selection might imply that the pool of immigrants is relatively more talented than the pool of unemployed residents. As well, immigrants will become more search proficient as time in Australia increases.

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jobs available for unemployed residents is given by:

$$V_0^s + V_0^u \tag{1}$$

where V is the number of vacancies, s denotes skilled workers and u denotes unskilled workers.

Immigration is assumed to create vacancies as a result of immigrant expenditure on goods and services employing skilled and unskilled workers. The aggregate change in employment for residents, as a result of immigration is given by:

$$\Delta E = \gamma s(s,)V_1^s + \gamma^u V_1^u - V_0^s - V_0^u \tag{2}$$

where $\gamma<1$ is the share of vacancies going to unemployed residents (rather than immigrants). Because the pool of unemployed skilled workers consists of unemployed residents (u^s) and immigrants, and the pool of unemployed unskilled workers is composed similarly with respect to residents and immigrants, it follows that:

$$\gamma^s = \frac{u^s}{u^s + l^s M} \tag{3}$$

$$\gamma^u = \frac{u^u}{u^u + l^u M} \tag{4}$$

where M is the number of adult migrants and l^s and l^u are the shares of adult immigrants entering the skilled and unskilled labour markets respectively.

Total vacancies in the immigration case consist of pre-existing vacancies (V_0) plus those created by immigrant spending.[13] That is:

$$V_1^s = V_0^s + k^s M \tag{5}$$

$$V_0^u = V_0^u + k^u M \tag{6}$$

where k is the proportion of a vacancy created by the spending of one adult immigrant on goods and services produced by skilled and unskilled labour.

Substituting equations 3–5 into equation 2 it follows that

$$\Delta E = \frac{u^s}{u^s + l^s M}(k^s M + V_0^s) + \frac{u^u}{u^u + l^u M}(k^u M + V_0^u) - V_0^s - V_0^u \tag{7}$$

We are interested in the conditions under which the relative employment opportunities for unemployed residents are greater given immigration. The conditions under which ΔE is greater than 0 can be demonstrated by rearranging equation (7), which results in:

$$\Delta E = \left(\frac{-l^s M}{u^s + l^s M}\right) V_0^s + \left(\frac{-l^u M}{u^u + l^u M}\right) V_0^u + \frac{u^s k^s M}{u^s + l^s M} + \frac{u^u k^u M}{u^u + l^u M} \tag{8}$$

Dividing by M and rearranging we get:

$$\frac{\Delta E}{M} = \frac{\left(u^s k^s - l^s V_0^s\right)}{u^s + l^s M} + \frac{\left(u^u k^u - l^u V_0^u\right)}{u^u + l^u M} \tag{9}$$

The first term captures the changes in the employment prospects of skilled residents, while changes in the employment prospects of unskilled residents are given in the second term. The denominators capture total skilled and unskilled unemployment respectively, and are positive. Thus, the sign of equation (9) depends on the signs and relative magnitudes of the terms in brackets. The relative employment opportunities of unemployed residents will be greater with immigration whenever equation (9) is positive.

Unfortunately it is not possible to use existing information to evaluate equation (9) because data do not separate unemployment or vacancies into 'unskilled' and 'skilled' categories. Still, it is possible to gain additional insight into these relationships by simplifying the model and using existing data to evaluate the change in employment.

V Empirical Illustrations of a Simplified Model

Simplifying the Model

The essential result of the model, equation (9), can be simplified by assuming that there is homogeneous labour rather than skilled and unskilled categories. Equation (9) becomes:

$$\frac{\Delta E}{M} = \frac{\left(uk - lV_0\right)}{u + lM} \tag{10}$$

[13] It is posssible in theory that immigrants converting their savings into Australian dollars affect the conclusions of the model. However, the total value of transactions of the Australian dollar is of the order of $A40 billion per working day, there being no prospect that immigrant currency transactions would have any discernible consequences on exchange rates.

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The change in employment as a result of immigration (ΔE) will be positive whenever

$$\frac{k}{l} > \frac{V_0}{u} \qquad (11)$$

Not surprisingly, the more jobs immigrants create (the larger is k), and the less jobs they are likely to take (the smaller is l), the greater is the chance of immigration increasing the employment probabilities of residents.

Of considerable interest is the additional result that the employment prospects of an unemployed resident are more likely to be improved as a result of immigration if vacancies created per immigrant relative to the immigrant labour force participation rate (k/l) are higher than the initial vacancy to unemployment rate (V_0/u). This means that the effect of immigration on residents' employment chances depends critically on the state of the labour market as represented by the initial vacancy to unemployment ratio. Specifically, and perhaps counter-intuitively, the more recessed is the labour market (that is, the lower is (V_0/u), the more likely it is that immigration increases the job prospects of unemployed residents.

This business cycle result arises because a given level of immigrant expenditure increases the vacancy/unemployment ratio proportionately more when the ratio is very low (i.e. when the economy is recessed). Alternatively, if vacancies are high relative to unemployment (when the economy is buoyant), it is less likely that a given level of immigrant expenditure will make the ratio even higher.

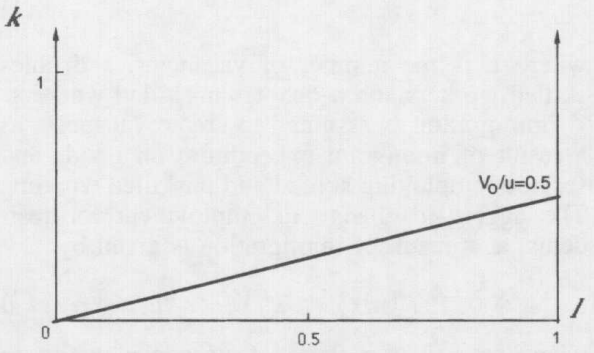
Diagrammatic Representation of the Simplified Model

Figure 1 illustrates the basic relationships between k, l, and V_0/u given by equation (11). When the average number of vacancies created by each immigrant's initial spending (k) is equal to the product of immigrants' labour force participation rate and the ratio of vacancies to unemployment (lV_0/u), immigration neither worsens nor improves the job prospects of unemployed residents. This is shown by the ray with slope equal to V_0/u.[14]

For combinations of k and l above the V_0/u line ($k > lV_0/u$) immigration increases the probability that an unemployed resident will find employment. For points below the line the reverse is true, with immigration leading to a lower probability of residents leaving unemployment.

FIGURE 1

Unemployed Resident Job Prospects and Immigration: A Stylized Representation



It is important to note several things in interpreting the model. First, k is always positive (that is, immigrant expenditure creates more than zero vacancies), and in theory this parameter is unbounded upwards.[15] Second, l must lie between 0 and 1, because it is the probability that an average adult immigrant participates in the labour market. Third, V_0/u reflects the state of the labour market and is in principle unbounded upwards, but the data over the last 20 years or so (presented below) suggest strongly that the ratio is never likely to exceed about 30 per cent.

Empirically Evaluating the Simple Model

With this more simple theoretical framework it is possible to use Australian data to set reasonable boundaries on the propensity for immigration to increase or decrease the employment probabilities of unemployed residents. We now consider the derivation of the essential parameters.

The most complicated parameter to derive is k, the average job creation from initial immigrant expenditure. To calculate k two bits of information are necessary. The first concerns the financial resources immigrants have available for consumption upon arrival, and the second relates to the

[14] In this illustrative case it should be noted that the V_0/u ratio is assumed to be 0.5, which is higher than has been experienced in Australia. This implies that the area shown above the V_0/u line is greater than suggested.

[15] A possibility not explored is that firms will react to the increase in demand from immigrant expenditure by running down inventories rather than by increasing employment. However, the conditions that will make this problematic are restrictive (Chapman and Cobb-Clark 1998).

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amount of consumer spending necessary to create a job.

Information about the amount of financial resources that immigrants bring into the country is drawn from Wave 1 of the Longitudinal Survey of Immigrants to Australia (LSIA), which surveyed 5192 immigrants arriving in Australia between 1993 and 1995. Respondents were asked about the level of financial (and other) assets they brought into Australia initially, as well as the level of financial assets transferred after arrival. The former figure was $15 141 per average adult immigrant.[16]

In the calculation of k we do not account for assets brought in after arrival, which averaged around a further $5000 per adult immigrant. Not taking this into account means that the modelling has the potential to under-estimate k because immigrant expenditure from assets available post-arrival will also create vacancies.

Knowing the level of financial resources immigrants bring to Australia provides an approximation of initial expenditure, which will obviously depend on how quickly immigrants consume from past savings. To illustrate the sensitivity of the estimates to different rates of expenditure, three assumptions have been imposed: that immigrants spend 100, 75 and 50 per cent of initial financial resources on arrival. While there are no data to support the use of these assumptions, they would seem to provide a sensible range.

The next step is to estimate the consumer spending necessary to create a vacancy. This is a somewhat complicated exercise, with two approaches being adopted. The first, employed by Piggott and Chapman (1995), is essentially an accounting exercise using Australian data. In this approach it is assumed that the vacancy when filled pays the annual pre-tax salary of the average Australian job in 1995. To this average salary we added a small amount (3 per cent) to cover compulsory superannuation costs incurred by employers. This method gave a total average figure of $30 644. We added a further 35 per cent to cover capital and other costs associated with employment, which reflects the assumption that the wage bill is around 65 per cent. The method results in a total cost of $47 145 (see Piggot and Chapman 1995).

The second approach uses information from a US study of the relationship in 1993 between consumption expenditure on domestically produced goods and services, and domestic employment (Pfleeger 1996). These data allow a very approximate estimate of the average expenditure associated with a unit of employment in the US. To make the numbers useful in an Australian context for 1995 we have adjusted for both inflation and the 1993 exchange rate, and estimate that for each $A65 059 of annual consumer expenditure one job is created.

While it is very broad brush, the approach using US estimates of the relationship between expenditure and jobs has an important advantage over the Piggott and Chapman exercise since it implicitly takes into account adjustment processes of labour demand related to both inventories and labour hoarding. This might explain why it is higher than the Piggott and Chapman figure. If some part of the production adjustment to changes in demand takes the form of variations in inventories or work intensity, this will be reflected in the data. On the other hand, a possible weakness of using the figure derived from US data is that the approach implicitly assumes that Australian and US expenditure, production and employment relationships are similar.

From these data we are in a position to approximate different levels of k. At this stage, however, it is not reasonable to describe these values as upper and lower boundaries because they are simply estimates of what k might be given different methodologies employed in its estimation. Therefore, to give the exercise a range of feasible parameters and thus outcomes, we have employed the following simplifying assumptions.

Imagine that the upper estimate of k is too low, and the lower estimate of k is too high, both by the order of 25 per cent. Given the difference between the estimated range of k, of about 40 per cent, it seems reasonable to add to this range about 50 per cent in order to illustrate the likely highest and lowest estimates. This is clearly arbitrary, but the exercise is illustrative.

With these assumptions the possible boundaries of k are illustrated in Table 1 for the different assumptions about expenditure out of savings, each adjusted for potential upper and lower boundaries.

These estimates should be interpreted as follows. If the average immigrant spends all

[16] Some of the immigrants arrived at the end of 1993, while others arrived in the following 18 months or so. Since the data have not been adjusted for inflation, there is a slight measurement error involved in using the figure. Price inflation at the time was only around 2–3 per cent per annum.

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savings brought into Australia as soon as they arrive, and the Australian figure is used concerning the amount of expenditure required to create an annual job, about 0.32 of a vacancy results. In estimating the potential boundary of the estimate we have added 25 per cent, which results in an upper estimate of k of about 0.4.

On the other hand, if immigrants only spent half of their savings immediately, and the US figure is used concerning the amount of expenditure required to create an annual job, about 0.12 of a vacancy is created. To illustrate a possible lower limit with respect to this figure we have reduced it by 25 per cent, which results in a lower estimate of k of about 0.09.

It is much more straight forward to estimate the boundaries for the adult immigrant labour force participation rate. LSIA data reveal that 58 per cent of recently arrived adult immigrants were participating in the labour force five to six months after arrival. In order to consider a reasonable range of possibilities, it is assumed that the lower and upper boundaries for the probability of labour market participation are 0.5 and 0.7 respectively.

One of the major results of the model is that the chance of immigrants increasing the employment probabilities of unemployed residents depends on the state of the labour market, as represented by the vacancy to unemployment ratio. In particular, the prediction from the model is that it is more likely that immigration increases unemployed residents' employment prospects the more recessed is the labour market.

Fortunately, the Australian vacancy data are very good by international standards, with a consistent survey of businesses being conducted quarterly since 1978. Similarly, unemployment survey data are available for at least this time period. Figure 2 shows the vacancy to unemployment ratio for 1978 to 1997.

The data reveal that V_0 is always considerably less than u, with the ratio never being more than about 30 per cent. In addition, it is clear that the ratio fluctuates considerably, falling to around 5 per cent in the recessions of the early 1980s and 1990s, and peaking at over 25 per cent in 1989. The average over this time period is 0.13.

It is now possible to show what the model predicts for the contemporary Australian labour market by redrawing Figure 1 using these parameters. This is illustrated in Figure 3.

Recall that the level of k is assumed to lie between about 0.09 and 0.4, and l is assumed to range from 0.5 to 0.7. The intersection of these gives rise to the shaded box of feasible combinations of k and l. Next consider possible values of the V_0/u ratio, which was bounded by 0.26 and 0.04, with an average value of 0.13 over the 1978 to 1997 period. These estimates are shown by the three rays of Figure 3.

Recall that immigration increases the employment probabilities of unemployed residents for any given V_0/u ratio if the combination of k and l yields a point which lies above the V_0/u ray. Given the feasible combinations of k and l, it follows from Figure 3 that for a great many of the possible levels of the V_0/u ratio immigration appears to be net job creating for residents. There are several ways of illustrating this essential point.

The first concerns the average V_0/u of 0.13. At this level of relative labour demand it is clear that there is almost no feasible combination of k and l that would mean that increases in immigration decrease residents' job prospects. That is, for a 'typical' year in terms of the business cycle higher levels of immigration improve the employment chances of unemployed residents.

A second illustration of the basic result concerns the calculation of the V_0/u ratio for which all feasible k and l combinations imply that immigration increases the employment prospects of unemployed residents. In the figure the V_0/u ray which would intersect the bottom right corner of the shaded box, turns out to be 0.125. Thus, given the assumed feasible range of k and l, it is only when V_0/u exceeds 0.125 that immigration possibly decreases the employment prospects of unemployed residents. It is of interest that for the

TABLE 1

Estimates of k, *Job Creation from Average Immigrant Expenditure*

Assumed Proportion of Savings Spent on Arrival	1	0.75	0.5
Using the Australian Accounting Exercise	0.321	0.241	0.161
Using the US Expenditure and Employment Exercise	0.233	0.175	0.117
Using the Australian Accounting Exercise Figure Adjusted Up	0.401	0.269	0.201
Using the US Expenditure and Employment Exercise Figure Adjusted Down	0.176	0.132	0.0875

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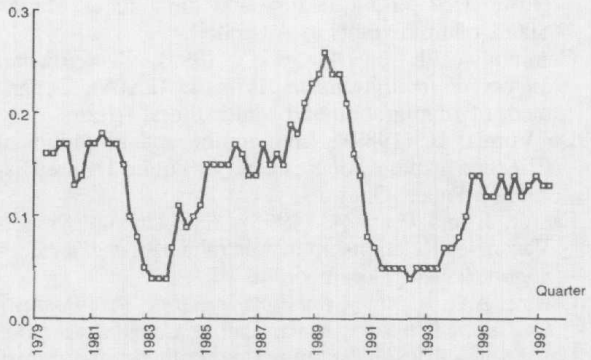
FIGURE 2

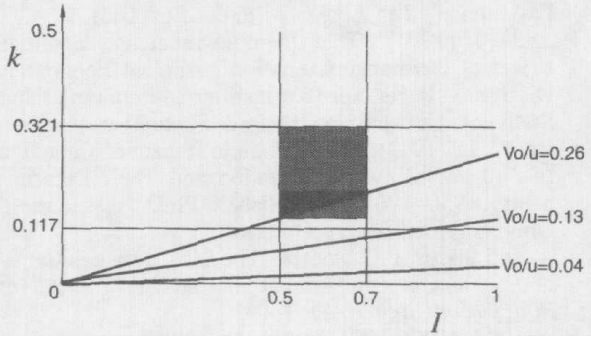
The Job Vacancies to Unemployment Ratio: 1978 to 1997



Source: Job Vacancies, ABS Cat. No. 6450.0

FIGURE 3

Feasible Ranges of Outcomes for Australia



76 quarterly observations of V_0/u in the 1978 to 1997 period, only 21 were higher than 0.125, which means that for well over 70 per cent of the period immigration increased the employment prospects of unemployed residents.

A final way of making the point is to consider the likelihood of immigration increasing the employment prospects of unemployed residents when V_0/u is at its highest, the situation in which immigration is least likely to assist the job prospects of unemployed residents. The maximum V_0/u ratio observed between 1978 and 1997 is 0.26. At this ratio the area of the box below the top ray relative to the entire area of feasible combinations of k and l represents the relevant probability that immigration reduces employment prospects. This area is 21 per cent of the entirety, suggesting that immigration is expected to increase the employment prospects of unemployed residents in about 80 per cent of cases even when V_0/u is at its maximum.

VI The Bottom Line

In this paper a model has been developed to analyze the short-run implications of immigration for the probability of unemployed residents gaining a job. We first modelled the relationships by assuming different skill compositions of both unemployed residents and immigrants. This approach also allowed some insights into the potential role of the nature of immigrant expenditure. In order to derive some understanding of likely outcomes for Australia, the model was simplified and used to generate empirical results.

The essential conclusions are, first, that the probability that immigration increases the employment prospects of residents is positively related to the number of vacancies created by initial immigrant expenditure, and negatively related to the labour force participation rate of immigrants on arrival. The second main conclusion from the modelling is the (possibly counter-intuitive) result that the likelihood of immigrants increasing the job prospects of unemployed residents is higher the more recessed is the labour market. This casts doubt on populist sentiment that immigration should be cut in recessions because immigrants 'rob' jobs from residents.

Using Australian empirical evidence, it has been possible to determine feasible boundaries of the key parameters affecting employment outcomes in aggregate. These data suggest that under the majority of Australian labour market circumstances between 1978 and 1997 immigrants increased the short-run employment prospects of unemployed residents. This finding is consistent with Harrison's (1984) work on the South Australian labour market. As he notes, the high unemployment rates among recent immigrants most likely exist precisely because they have been unsuccessful in taking jobs from residents.

Still, the above does not imply that policy makers should adopt high levels of immigration in recessions, for two reasons. First, the analysis is decidedly short run. While immigrant spending immediately after migration seems to create more jobs than immigrants initially take, over the longer run this may change as spending tapers off and immigrants move into employment. Assessing how quickly this might occur would require a more complex model than the one proposed here.

Second, there are a host of factors that influence the optimal size and mix of immigration which have not been examined. These include the implications of immigration for: government spending

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(and thus taxes), infrastructure investment, and the environment. The effects of immigration on the employment prospects of residents might well be accorded a low weight in determining government immigration priorities.

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Economic Record is published by John Wiley & Sons Australia, Ltd
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