THE DETERMINANTS OF INTERREGIONAL MIGRATION IN QUEENSLAND[1]

Bernard Trendle

Labour Market Research Unit, Department of Employment and Training, GPO Box 69. Brisbane, QLD 4001

ABSTRACT: This paper evaluates the determinants of interregional migration in Queensland over the 1996 to 2001 inter-census period using a gravity type model of migration. In this model, migration flows depend upon relative economic opportunities in the origin and destination regions. The model is implemented using data from both the 1996 and 2001 census's, with data from Queensland's Statistical Divisions being used. The model is found to explain over 80 percent of the observed interregional migration flows, however, it is also found that some of the results are contrary to expectations. It is concluded that there are factors, apart from the variables incorporated in the model, serving to concentrate the labour force in the south east corner of Queensland, the most densely settled area of the state. This region also experienced the highest rates of unemployment during the 1996 and 2001 censuses.

1. INTRODUCTION

The topic of regional migration has received considerable attention within regional science. Uneven patterns of regional performance, including employment growth, are likely to result in disparities across regional labour markets. These disparities may result in uneven pressures on wages and unemployment, which to some extent provide incentives for and may be reduced by, regional migration. In particular, shifts in the geographic distribution of the population could be an important device in reducing regional disparities.

This study considers the determinants of regional migration in Queensland with a particular emphasis on the migration response to labour market incentives, such as unemployment and wage differentials. At the regional level, migration may play a role in labour market adjustment. To investigate the determinants of migration and its role in regional labour market adjustment, a gravity model is used. Molho (1986) notes that the gravity model was initially conceived from an analogy between spatial behaviour and Newtonian physics. This modelling framework has been found to be remarkably successful in explaining a wide variety of different forms of spatial interaction, ranging from migration, commuting, shopping and trade flows.

The empirical success of this type of model has led analysts to consider the sort of theoretical structures that would give rise to such patterns of behaviour, and thus provide the model with some form of behavioural underpinnings which might even assist in the interpretation of empirical results. Further, many economists and geographers have attempted to rationalise the model in terms of

---

[1] The views expressed in this document are those of the author(s) and should not be considered as necessarily representing the views of the Department of Employment and Training or the Queensland Government.

standard microeconomic theory (see, for example, Smith, 1975, 1978; Sheppard, 1978; and Anderson, 1979).

Molho (1986) notes that the general view to emerge from this literature, is that the fundamental issue in relating the gravity model to economic theory is one of aggregation. While microeconomic theories of migration start at the level of the individual, most such models will generate some form of gravity formulation when aggregated over homogeneous population groups. For example, the human capital explanation of migration[2] would suggest a rather broader variety of social, economic and environmental push and pull factors, as well as explicitly incorporating some form of distance deterrence function to take into account the transportation and psychic costs to moving. The relative importance of such variables raises empirical questions which may be tested within a gravity model formulation. For this reason it has been noted that the greatest virtue of the gravity model has not been its contribution to theory, but rather its generality, i.e. its ability to encompass different theoretical perspectives within a readily estimable empirical framework (see, for example, Molho, 1986, or Batten and Boyce, 1986).

The following section of this paper provides a descriptive analysis of the Queensland regional labour market and regional migration within Queensland. This is followed in section 3 with the development of a microeconomic explanation of interregional migration, an outline of the data used in the analysis is also provided in this section. Section 4 provides the results from the estimation of two versions of this model, while the final section discusses the implications of these results and provides a brief conclusion.

2. REGIONAL UNEMPLOYMENT AND MIGRATION IN QUEENSLAND

Previous work on Queensland's regional labour market has concentrated on the timing and strength of labour market adjustment processes (Trendle, 2000 and 2001), regional unemployment disparities (Trendle, 2002) and the relationship between regional unemployment and regional decline (McGuire, 2001). In contrast, the current work focuses on the determinants of regional migration with the intention of uncovering its role, if any, in regional labour market adjustment and thus, while broadly related to much of the previous research, is more specific in nature.

Migration is frequently considered an important mechanism for labour market adjustment at a regional level. From a theoretical perspective, high unemployment is likely to act as an incentive for residents to leave a region, being drawn to regions with lower unemployment and thus, more labour market opportunity (see, for example, Marston 1985).

Table 1 provides data on population and unemployment at the Statistical Division level in Queensland at the time of the 1996 and 2001 census. For the purpose of this study, the Brisbane and Moreton Statistical Divisions have been aggregated together. Brisbane is almost completely encircled by the Moreton

[2] For an explanation of the human capital theory of migration see Molho (1986).

Statistical Division and it is likely that migration between these two regions is due to factors outside this model.

Table 1. Population and Unemployment Rates, 1996 and 2001

	Population			Unemployment Rate		
	1996	2001	Change	1996	2001	Change
Brisbane - Moreton	2,068,720	2,303,136	234,416	9.9	8.3	-1.6
Wide Bay - Burnett	217,757	228,045	10,288	15.0	11.7	-3.2
Darling Downs	194,050	202,475	8,425	7.4	6.7	-0.7
South West	25,728	25,952	224	6.3	4.4	-1.9
Fitzroy	172,873	174,771	1,898	9.1	8.0	-1.2
Central West	12,161	12,163	2	6.9	3.7	-3.2
Mackay	129,465	132,533	3,068	7.7	7.3	-0.4
Northern	173,299	183,290	9,991	8.4	7.8	-0.6
Far North	203,243	212,647	9,404	8.0	7.7	-0.3
North West	34,826	34,597	-229	5.9	5.6	-0.2
Standard deviation				2.6	2.2	

The data presented in Table 1 indicates that over the 1996 to 2001 period, the standard deviation of the regional unemployment rates has declined from 2.6 to 2.2 percentage points. This decline in the standard deviation has been accompanied by a decline in the average unemployment rates from 8.9 percent in 1996 to 7.4 percent in 2001. However, after standardising the unemployment rates, i.e. dividing by the average of the Statistical Divisions for each year, it is found that the standard deviation has remained almost unchanged (i.e. after this has been done the standard deviations are found to be 0.31 and 0.32 for 1996 and 2001 respectively, a very slight increase over the period). This result is consistent with the evidence uncovered in Trendle (2001), where it has been shown that the disparities in regional unemployment rates have been highly persistent in the case of Queensland.

Table 2 provides data on migration flows within Queensland from origin (top row) to destination (columns) regions between 1996 and 2001. It can be seen in this table that for many regions the south east corner of Queensland, i.e. the Brisbane - Moreton region was the main destination, accounting for 40 percent of regional migration within Queensland. The data in Table 2 indicates that, overall, just over 230 thousand persons migrated across Statistical Division boundaries within Queensland over the 1996 to 2001 period. This number, while significant, is dwarfed by the volume of interstate and overseas migration into Queensland, which totalled 1.0 million and 119.3 thousand persons respectively, for the same period.

Table 2. Regional Migration Flows, Queensland 1996-2001

	Brisbane	WBB	Darling Downs	South West	Fitzroy	Central West	Mackay	Northern	Far North	North West
Brisbane	-	20615.6	17822.3	2703.5	13206.6	1234.0	9476.6	10787.5	12620.0	3175.0
WBB	15339.8	-	2726.2	572.6	3262.8	310.6	1653.8	1456.8	1617.2	806.1
Darling Downs	12547.8	3094.9	-	2414.0	2096.1	530.7	1002.7	1262.3	798.6	518.8
South West	1609.8	475.2	1330.0	-	327.1	191.8	128.9	109.8	116.9	137.0
Fitzroy	6837.4	3238.1	1435.0	351.7	-	634.5	3853.6	1289.1	1360.8	1005.9
Central West	671.1	231.0	274.8	224.2	460.3	-	219.0	167.8	127.3	264.7
Mackay	4789.5	1388.1	647.2	160.1	3879.6	205.6	-	1756.9	1221.6	697.2
Northern	6816.5	1306.0	1076.0	172.6	1621.8	292.3	2748.4	-	4336.3	2628.5
Far North	6923.3	1214.9	805.2	125.5	1544.8	166.1	1337.6	3413.0	-	1046.1
North West	1920.6	534.1	397.0	124.5	482.9	286.6	363.4	1047.8	1007.7	-
Total	57455.8	32097.9	26513.6	6848.7	26881.9	3852.3	20783.8	21291.1	23206.3	10279.3

Another perspective of regional unemployment variation can be found in Figure 1, which maps Queensland's regional unemployment rates. Using this map, along with the data presented in Tables 1 and 2, it can be seen that the regions with the highest unemployment rates are clustered in the south east corner of the state and comprise the Brisbane, Moreton and Wide Bay-Burnett Statistical Divisions. Interestingly, these regions recorded among the highest population growth over the 1996 to 2001 period, with the Brisbane and Moreton region combined, recording population growth of 11.3 percent, while the Wide Bay-Burnett region recorded growth of 4.7 percent, this compares to an average population growth of 4.4 percent for all Queensland regions.

3. A MODEL OF INTERREGIONAL MIGRATION

Batten and Boyce (1986) note that gravity models originated in the study of human geography and have frequently been used in the study of migration decisions. These models are concerned with the role of space in determining migration. The gravity model, in its most general form, posits gross migration flows within a regional network to be a function of origin and destination specific push and pull factors. These factors may include the size of the regional populations, relative housing prices and relative labour market conditions, which are combined multiplicatively with some form of distance deterrence function, reflecting the degree of spatial separation between the origin and destination regions. Formally this type of model may be written as:

$$N_{ij} = A_i B_j f(D_{ij}) \tag{1}$$

In equation (1) the subscripts i and j are the areas of origin and destination respectively, N is the number of migrants, D is the distance between i and j, which affects migration according to some monotonic inverse function $f(\ )$, and A_i and B_j are origin and destination specific factors, pushing or pulling migrants to or from the corresponding areas.

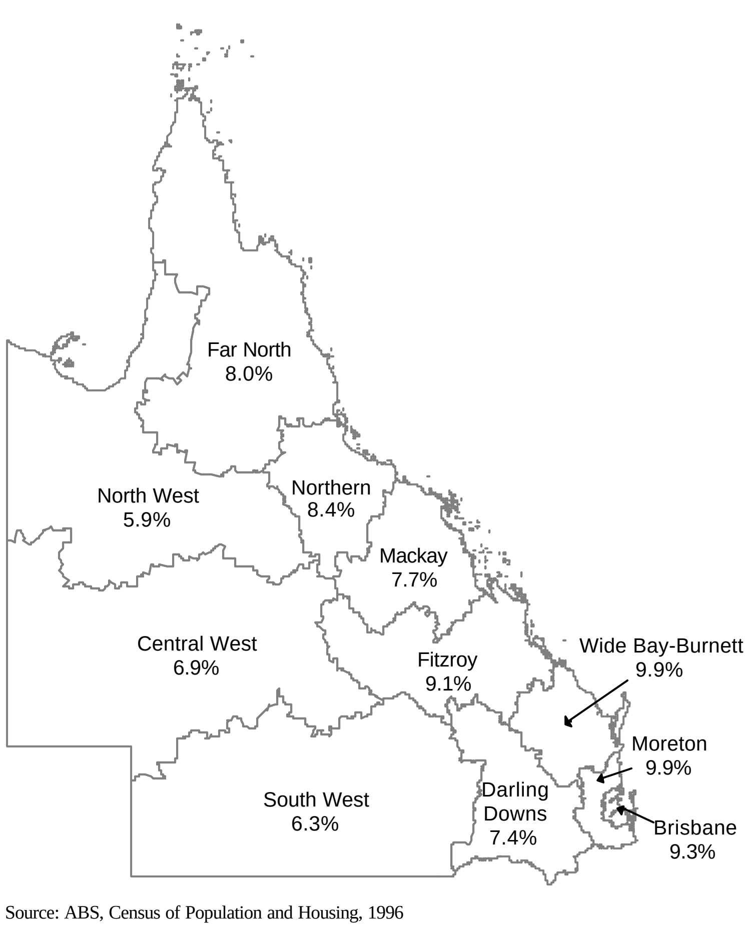

Figure 1. Queensland Regional Unemployment Rates, Census 1996

Gravity models can be specified so as to be consistent with a wide range of theoretical explanations of interregional migration (see, for example, Smith 1975, 1978, Sheppard 1978, Anderson 1979, Boots and Kanaroglou 1988, Gabriel, Shack-Marquez and Washer 1993 and Aroca and Hewings 2002). This section develops a theoretical model consistent with the neoclassical explanation and closely following the work of Boots and Kanaroglou (1988), Gabriel, Shack-Marquez and Washer (1993) and Aroca and Hewings (2002).

The model of these latter three studies, while having the gravity formulation as its basis, draws on neoclassical consumer theory assuming that migration decisions can be represented by the utility maximisation problem, represented by equation 2 over the *j* destination regions:

$$\underset{X_j T_j}{Max} \; U_j(X_j, T_j, Z_j) \tag{2}$$

Subject to the budget constraint:

$$I_j \geq P_x X_j + P_{Tj} T_j \tag{3}$$

In equations 2 and 3, X_j is a composite good other than transportation that the migrant demands in location *j*, T_j is equal to 1 if transportation is necessary to move from the origin to region *j* and zero otherwise, Z_j is the set of other characteristics of region *j* that are taken into account by the migrant, I_j is the income in region *j*, and P_x and P_{Tj} are the prices of goods and transportation respectively. P_{Tj} changes as a function of the distance and it is assumed that it increases at a decreasing rate. Furthermore, it is assumed that the prices of goods are invariant across all regions[3].

With the origin region denoted by *i*, the indirect utility function for a person that is evaluating a decision to migrate from region *i* to region *j* can be presented as:

$$V_j = V_j(P_x, P_{Tj}, I_j, Z_j) + e_j \tag{4}$$

where, e_j is a stochastic error. Since it is assumed that prices of goods are the same everywhere, this variable does not enter into the migration decision.

Within this model, the potential migrant compares the utility that they can derive from each possible destination region, including their own region, before choosing the region that yields the highest utility. Following Boots and Kanaroglou (1988), Gabriel et al (1993) and Aroca and Hewings (2002), the potential migrants utility maximising selection is cast as a random utility process subject to a stochastic error which, if it is assumed to have a generalised extreme value distribution, results in the following logit specification, with the probability of a worker moving from region *i* to region *j* given as:

$$M_{ij} = \exp^{V_j} / \left[\sum_{j=1}^{n} \exp^{V_n} \right] \tag{5}$$

where *n* is the number of alternative regions in which the migrant can move, including the origin region.

As with the work of Aroca and Hewings (2002), only aggregate data is available for this current study. Following the methodology used by these authors additional derivations have been made. Firstly, imposing the constraint that $\sum_{j=1}^{n} M_{ij} = 1$ and normalising by the probability of staying in the current region (P_{ii}), equation (5) can be modified to the following form:

[3] Queensland's Government Statistician's Office (GSO) estimates a spatial price index. Data compiled in this document indicates that there is some variation in prices across Queensland. The author acknowledges this, constant prices across geographic space in this case are assumed to make the model more tractable.

$$\ln\left(\frac{M_{jj}}{M_{ii}}\right)=V_j - V_i = a_0 + a_1 P_T j + a_2 (I_j - I_i) + a_3 (Z_j - Z_i) \qquad (6)$$

where the a's are coefficients or vectors of coefficients associated with the variables that determine the indirect utility function which, in this case, is assumed linear in the variables.

To estimate the model, data from the 10 Statistical Divisions of Queensland are used. As already noted, the Brisbane and Moreton Statistical Divisions have been added together for the purpose of this exercises. Brisbane is almost completely encircled by the Moreton region and migration across regional boundaries here is likely to involve short distances and perhaps be for a different reason than moves of greater distance. This data has been derived from the 1996 and 2001 Australian Bureau of Statistics, Census of Population and Housing. The data shows, for those who have moved, the Statistical Division in Queensland that the residents were in the preceding 5 years and thus provides an indication of the number of migrants to each Statistical Division over this time period.

The 1996 census is also the source of regional population, which enters into the model as POP_i, the population of the origin region and POP_j, the population of the destination region. These variables are used to capture the regions amenity value. The other variable, also used to represent regional amenity values in $HEALTHED_{ij}$ the difference in the number employed in health and education per capita in the origin and destination regions. Regional unemployment rates at the time of the 1996 census are also derived from the same data source. Differences in regional unemployment rates are often thought to be significant determinants of the decision to migrate. In the estimated equation, the unemployment rates of the origin and destination region ($UERATE_i$ and $UERATE_j$ respectively), enter in as determinants of the decision to migrate to a particular region.

The distance between regions is also incorporated in the model. This variable is used as a proxy for the transport cost of moving from one region to another. Many studies use distance and its square. In the initial stages of the modelling exercise both of these variables were included. However, it was found that this resulted in a very high degree of collinearity, leading to concern about the precision of coefficient estimates. As a result, it was decided to use the logarithm of distance, with the coefficient becoming the elasticity effect of a change in the distance. This appears to have overcome this problem. In this exercise distance has been calculated as the road distance, using the shortest route between the main urban centre in each region. The income variables, $WAGE_i$ and $WAGE_j$, the origin and destination region incomes, were derived from Australian Taxation Office (ATO) data and have been derived as the taxable income for the region divided by the number of persons with a taxable income in the region. This data relates to the 1996-97 financial year.

An alternative specification of the effects of unemployment and wages was trailed in some preliminary versions of the model. Following Harris and Todaro (1970) and Gabriel, Shack-Marquez and Washer (1993) a variable was derived which assumes that potential migrants behave as though they maximise their expected earnings by comparing their relative earnings potential in each region. This variable is derived as:

$$EED_{ij} = [(1-UE_i)WAGE_i - (1-UE_j)WAGE_j] \tag{7}$$

Gabriel, Shack-Marquez and Washer (1993) note that a finding that $\partial \ln(M_{ij} / M_{ii}) / \partial EED_{ij} < 0$ would reflect the draw of better income prospects in more economically prosperous regions. However, this variable was not significant in all estimated models in which it was incorporated and so was omitted from latter specifications.

A variable to characterise the relative location of the region in the state was also incorporated in the model (S_{ij}). Some earlier studies (see, for example, Boots and Kanarglou 1988 and Aroca and Hewings 2002) have incorporated data from a contiguity matrix to capture the degree of each regions linkage to the core/central region in the economy. In particular, the work of Griffith (1987) has shown that e_i, the principal diagonal vector of the contiguity matrix, can be used as a measure of the relative centrality of the *i*th region. This measure has been shown in Griffith (1987) to be the best single measure of individual regional centrality. It can be derived from the regional contiguity matrix, since it reflects both the physical position of a zone in the overall set of zones and the connectivity of the zone[4].

4. MODEL ESTIMATION AND RESULTS

The model presented in Table 3 was initially estimated using conventional OLS techniques. However the diagnostics indicated that heteroscedasticity was a problem and the models were re-estimated using a technique that provided standard errors robust to this heteroscedasticity. Two versions of the model are provided in Table 3. The first incorporates all variables, except $HEALTHED_{ij}$ for the origin and destination regions. In contrast, in the second equation the labour market variables *WAGE*'s and *UERATE*'s, enter as differentials between the origin and destination regions, with the differentials derived as the origin region unemployment or wage rate minus the destination region rate. These two versions of the model are provided because it is not clear whether regional values or regional differentials are important in determining unemployment rates (see, for example Gabriel, Shack-Marquez and Washer 1993).

In addition to the estimated coefficients, Table 3 also provides the standard

[4] This measure was used to derive and analogous measure to distance, i.e. centrality distance between two regions, *i* and *j*. For example, using d_{ij}, it is impossible to distinguish between moves between zones within regions near the core region of the economy and moves between neighbours at the fringe since both will involve small d_{ijj}, for this reason S_{ij} is constructed as $s_{ij} = [| e_i - e_j | / (e_i - e_j)]$ where e_i and e_j are the values for zones *i* and *j* respectively, on the principal eigenvector of the contiguity matrix. Small values of S_{ij} indicate pairs of regions with similar relative locations while large values of S_{ij} indicate regions with dissimilar relative locations.

errors, t-statistics and associated probabilities for the individual variables. Of the results presented in Table 3 we can say that, in general, the estimated parameters are significantly different from zero and the regressions explain between 72 and 74 percent of the observed variation in interregional migration patterns.

Table 3. Gravity Models of Migration Flows

	Coefficient	t-statistic	Significance	Coefficient	t-statistic	Significance
Intercept	-4.0177	-1.9580	*	-0.0623	-0.0700	
LOGDIST	-1.3177	-4.4790	***	-1.3679	-4.5500	***
POPi	-0.0006	-4.3990	***	-0.0006	-3.6780	***
POPj	0.0010	9.8490	***	0.0010	8.8770	***
HEALTHEDij	-0.0376	-4.7210	***	-0.0376	-4.5330	***
WAGEi	-0.0406	-1.2760				
WAGEj	0.1375	4.4160	***			
WAGEij				-0.0889	-3.9870	***
UERATEi	-0.1142	-3.1620	***			
UERATEj	0.2299	6.8720	***			
UERATEij				-0.1720	-7.0630	***
Sij	-0.2450	-0.4000		-0.3748	-0.5710	
	Mean of dependent variable = -3.97 Standard error of dependent variable = 1.35 Sum of Squared residuals = 38.01 Standard error of residuals = 0.69 R squared =0.77 Adjusted R squared =0.74 F-statistic (9, 80) = 29.11, p-value < 0.00001			Mean of dependent variable = -3.97 Standard error of dependent variable = 1.35 Sum of Squared residuals = 41.62 Standard error of residuals = 0.71 R squared =0.74 Adjusted R squared =0.72 F-statistic (7, 82) = 34.00, p-value < 0.00001		

Note: *** indicates significance with p>0.001, ** indicated significance with p>0.01, * indicates significance with p>0.05 and . indicates significance with p>0.1.

The log of distance has the expected sign in both equations, thus providing evidence that the distance between regions acts as a deterrent for migration. This result can be taken as indicating, as predicted by our theory of migration, that all else being equal, increasing costs associated with distance, act to reduce migration flows.

When we consider the effects of regional characteristics on the probability of migration, it can be seen that the population of the origin region (POP_i) is negative and significant in both versions of the model. This can be taken as indicating that regions with larger populations have higher amenity values, which acts to reduce the probability of migration occurring. In contrast, the coefficient of destination region (POP_j) is positive and significant in both equations, supporting the hypothesis that larger regions have some positive regional amenity value attractive to potential migrants. Gabriel *et al* (1993) note that population size has frequently been associated with in-migration, apparently reflecting greater and perhaps less risky returns to migration to more highly populated regions. The results uncovered here for Queensland support this hypothesis.

The other variable incorporated to capture regional characteristics, or amenity values (*HEALTHED*$_{ij}$), the difference between the number of persons employed in the health and education industries per capita in the origin and destinations regions has a significant negative coefficient. This variable is derived by subtracting the destination from the origin region per capita ratio. This value is positive when the origin region per capita ratio of persons in these industries is greater than that of the destination region. In this situation then, the negative coefficient indicates that greater amenity values, as measured by this variable, act to reduce migration flows in line with our theory of migration.

The next group of variables relate to the wages and wage differentials between the origin and destination regions. In the first model, $WAGE_i$, the origin region average wage is insignificant while $WAGE_j$, the destination region average wage is positive and significant in the first of the estimated equations. This result suggests, in accordance with our theoretical explanation of migration, that the destination region wage has a positive effect on the migration decision, i.e. that high wage levels in a region attract potential migrants. In the second equation, where the wage is entered as a differential between the origin and destination regions (i.e. $WAGE_{ij}$), the variable is significant with a negative coefficient. The negative coefficient indicates that higher wages in the origin region, relative to destination regions, acts to reduce regional migration flows, again in accordance with our theory of migration.

Like wages, the unemployment rates of the origin and destination regions enter into both of the equations differently. In the first equation the unemployment rate of the origin region ($UERATE_i$) and the unemployment rate of the destination region ($UERATE_j$) are entered independently. For this equation, while both estimated coefficients are significant they are the opposite sign to that predicted by our theory of migration. In particular the negative coefficient on *UERATEi* suggests that higher rates of unemployment in the origin region act to reduce outmigration. In contrast, the positive coefficient on *UERATEj* suggest that higher rates of unemployment act as an incentive for in-migration. Furthermore, in the second estimated equation, where the unemployment rate enters as a differential, the sign is negative, again contrary to expectations.

Attempts to uncover the cause of this result using formally statistical techniques and the accessible data for this project have proved fruitless. For example, it was initially thought that this result was due to the large flows from regional Queensland to the Brisbane-Moreton region. Dropping all observations relating to flows to or from Brisbane-Moreton were trialled with much the same result with regards the signs of these variables. Further, replacing wages and unemployment rates with EDD_{ij}, the variable created using the mathematical specification of equation 7, produced an insignificant coefficient.

5. CONCLUSION

This paper has provided an analysis of interregional migration within Queensland over the 1996 to 2001 period. This has been done by using data that has been derived from the ABS and a variety of other sources. In doing this, the analysis has evaluated the determinants of regional migration flows and the role of migration in the arbitrage of regional labour market differentials.

By and large, the results have been shown to be consistent with our theoretical explanation of interregional migration. This theoretical model draws on neoclassical consumer theory, assuming that regional migration behaviour is based on a utility maximisation problem.

An important exception to this is the finding that, contrary to expectations, migration patterns seem to be from low unemployment rate regions to high unemployment rate regions, all else being equal in our model. Several attempts to account for this problem were trialled. For example, an equation was estimated with all flows to and from the Brisbane-Moreton region excluded. The resulting estimated equations were almost identical to those presented in Table 3. Further attempts were trialled by replacing both the wage and unemployment rate variables with EED_{ij}. This variable is constructed to test the hypothesis that potential migrants act as though attempting to maximise their expected earnings by comparing their relative earnings potential in each region, with both wages and unemployment rates entering into this variable. It was found to be insignificant in every equation in which it was incorporated.

These findings may have implications for the competing explanations of regional unemployment disparities, and also for the efficacy of regional policy. In particular, the equilibrium explanation of regional unemployment disparities emphasises the quick adjustment of regional unemployment rates following a shock. The observed differences are interpreted as an equilibrium phenomenon, occurring because the regions have different underlying levels of average unemployment in equilibrium (see, for example, Marston 1985). In this situation, economic disturbances may move actual regional differences away from their mean values, but such movements are short lived and regional differentials will quickly converge back to their equilibrium means.

In contrast, the disequilibrium explanation emphasises the slow adjustment that occurs in the labour market following an exogenous shock. According to this view, because labour market adjustment mechanisms are weak and slow, deviations of regional employment differentials from their average levels, caused by demand, structural, technological or other shocks, are very persistent. As noted by Armstrong and Taylor (1993), in this case regional unemployment differentials will not exhibit stable means but instead follow non-stationary paths.

The acceptance of one or the other of these explanations of regional unemployment disparities has important implications for regional policy. For example, in the equilibrium explanation of regional unemployment disparities, geographic areas may be in equilibrium with respect to one another and workers will migrate until there is no further incentive to move. In this situation, regionally targeted employment policy will merely attract more unemployed workers into the areas where jobs are being created. This will occur until any temporary reductions in regional unemployment have been offset. In contrast, in cases where the disparities are due to disequilibrium factors, the implications for regional policy are quite different. Regionally targeted policies in this situation, can have long lasting or permanent effects, as the mechanisms by which regions respond to the shocks, including policy shocks, are weak.

The results of the analysis undertaken in this study seem to provide little support for the equilibrium explanation of regional unemployment disparities. The results of our analysis suggest that interregional migration over the 1996 to 2001 period has been toward regions with high unemployment rates. This is apparent in Table 1 and also from the sign of the estimated coefficients for the estimated equations provided in Table 3. As a consequence, these results suggest that policy makers should look to mechanisms beyond migration in order to bring about regional adjustment to disparities in regional unemployment rates.

REFERENCES

Anderson, J. (1979) A Theoretical Foundation for the Gravity Equation. *American Economic Review*, 69, pp. 106-116.

Armstrong, J. and Taylor, J. (1993) *Regional Economics and Policy*, Harvester Wheatsheaf, Hemel Hempstead.

Aroca, P. and Hewings, G. (2002) Migration and Regional Labour Market Adjustment: Chile 1977-1982 and 1987-1992. *Annals of Regional Science*, 36, pp. 197-218.

Batten, D. F. and Boyce, D.E. (1986) 'Spatial Interaction, Transportation and Interregional Commodity Flow Models.' In P. Nijkamp (ed.) *Handbook of Regional and Urban Economics, Volume 1, Regional Economics*, Elsevier Science Publications: Amsterdam.

Boots, B. and Kanaroglou, P. (1988) Incorporating the Effects of Spatial Structure in Discrete Choice Models of Migration. *Journal of Regional Science*, 29(4), pp. 495-507.

Gabriel, S. A., Shack-Marquez, J. and Washer, W. (1993) Does Migration Arbitrage Regional Labour Market Differentials. *Regional Science and Urban Economics*, 23, pp. 211- 233.

Griffith, D. (1987) Toward a Theory of Spatial Statistics: Another Step Forward. *Geographical Analysis*, 19, pp. 69-82.

Harris, J. and Todaro, M. (1970) Migration, Unemployment and Development: A Two Sector Analysis. *American Economic Review*, 60, pp. 126-142.

Marston, S. T. (1985) Two Views of the Geographical Distribution of Unemployment. *Quarterly Journal of Economics*, 100, pp. 57-79.

McGuire, P. (2001) Regional Unemployment in Queensland: Dimensions and Policy Issues. *Australian Bulletin of Labour*, 27(4), pp. 296-313.

Molho, I. (1986) Theories of Migration: A Review. *Scottish Journal of Political Economy*, 33(4), pp. 396- 418.

Sheppard, E. S. (1978) Probabilistic Income Maximising Behaviour in Regional Migration. *International Regional Science Review*, 2, pp. 29-40.

Smith, T. (1975) A Choice Theory of Spatial Interaction. *Regional Science and Urban Economics*, 5, pp. 137-176.

Trendle, B. (2000) The Non-Cointegration of Queensland Regional Employment and Some Considerations for Regional Policy and Modelling. *Australasian Journal of Regional Studies*, 6(3).

Trendle, B. (2001) The Dispersion and Persistence of Queensland Regional Unemployment. *Australasian Journal of Regional Studies*, 7(2), pp. 189-208.

Trendle, B. (2002) Regional variation in Queensland's Unemployment rate. *Australasian Journal of Regional Studies*, 8(2), pp. 327-348.