Migration and Tourism Flows to New Zealand

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1. Introduction

Tourism is an important sector in many countries as a source of foreign exchange earnings. In the case of New Zealand, for example, the contribution of international tourism in the year ended March 2009 is $9.3 billion (in New Zealand dollars), which amounts to 16.4 percent of New Zealand's total exports of goods. (Statistics New Zealand (2009).) Not surprisingly, agencies such as the UN World Tourism Organization (WTO) and the World Trade Organization have been treating tourism processes as an equivalent to actual goods exports. It is surprising that there is hardly any empirical study in the literature that applies the existing trade theories and econometric approaches to investigate the determinants of tourism flows. (Zhang and Jensen (2007) and Garín-Muñoz and Amaral (2000) are two exceptions. A most recent study is Keum (2010). Law, D., M. Genç, and J Bryant (2009) is another example, though their focus is not tourism flows.)

This paper uses the most commonly used specification in empirical trade research, the gravity equation, to establish the determinants of tourism flows to New Zealand. It estimates a gravity model by using an unbalanced panel data set consisting of more than 190 countries that New Zealand has traded with between the years 1981 and 2006. The estimation technique employed is based on a panel Poisson model.

The focus of this paper is the effect of migration on tourism flows. Following Gould (1994), it has been widely accepted that through their ability to speak languages, navigate legal systems, and draw on social and commercial networks in their origin countries, migrants can potentially reduce barriers to international trade. There are numerous studies in international trade literature that have examined the effects of migration on trade flows. Almost all of these studies have found a positive relationship between immigration and trade regardless of the different samples, specifications, and estimation methods used in them. This paper tests whether, all else equal, tourism flows from countries with larger stocks of migrants are larger. The gravity model used controls for standard determinants of trade that might be confounded with migration, such as the size of the economy or the distance to New Zealand. By applying panel data techniques, unobserved permanent characteristics of countries and global trends that might stimulate both migration and trade are also controlled for.

2. Modelling Approach and Methodology

2.1. The gravity model

The basic idea behind the gravity model comes from the gravity theory in physics. Newton's law of universal gravitation states the gravitational attraction between two bodies is proportional to the product of their masses and inversely proportional to the square of the distance between them. In

trade models, the physical bodies are the exporting and importing countries, and their "mass" is their economic mass. In other words, the idea is that the bigger the sizes of the economies, the bigger the trade, and the greater the distance, the lower the trade. Thus, the basic gravity model can be written as

$$m_{ij} = G\left(\frac{E_i E_j}{D_{ij}^2}\right), \tag{1}$$

where m_{ij} is the level of trade (exports, imports, or total trade) between countries i and j, E_i is the economic mass of country i, D_{ij} is the distance between i and j, and G is the gravitational constant. This can be expressed in logarithmic form as

$$\ln m_{ij} = \ln G + \ln(E_i E_j) - 2\ln D_{ij}, \tag{2}$$

which can be viewed as

$$\ln m_{ij} = \beta_0 + \beta_1 \ln(E_i E_j) + \beta_3 \ln D_{ij}. \tag{3}$$

From an econometric point of view, this is a very simple specification where the parameter β_1 is the elasticity of trade with respect to the mass of the countries. In empirical trade models, the economic mass is typically proxied by the GDP (or some function of it) of the countries. It is also most common to extend the basic equation by including a number of factors that potentially facilitate or inhibit trade, such as cultural, geographical, and political characteristics. Such extended models are referred to as the 'augmented' gravity models.

2.2. Issues in Estimation

The standard approach to estimating the gravity model is to use the log-linear model in (3). Although this is very simple to implement, there are two potential econometric problems in doing the estimation. The first problem is due to the possibility of observing zero trade values. Because the proportion of observations with zero trade is often quite significant, the way these zeros are handled is important. There are various ways of overcoming this problem with various degrees of success such as discarding such observations, adding a constant factor to the volume of trade before taking its logarithm, and using a Tobit or Heckman type estimation method. The second problem is more fundamental, and is based on the fact that $E(\ln m) \neq \ln E(m)$ as implied by Jensen's inequality. As argued by Silva and

Tenreyro (2006), the standard practice of interpreting the coefficients in a log-linearized model estimated by OLS as elasticities can be highly misleading in the presence of heteroskedasticity.

Accordingly, Silva and Tenreyro (2006) suggest estimating the gravity equation multiplicatively, without taking the logarithm of *m*, and allowing for heteroskedasticity. Their proposed method of estimation is a simple Poisson regression, equivalent to the Poisson pseudo-maximum likelihood estimator. As with the log-linearized model, this model also yields the elasticities if the independent variables are in logs. Furthermore, it also represents a natural way to deal with zero trade values and gives consistent estimators even when the variance function is misspecified.

Both of these problems are avoided when the dependent variable, the volume of trade, is a count variable rather than a continuous variable. The data used in this paper are obtained as the number of visitors arriving to New Zealand. Therefore, the gravity model estimated in this paper is based on a panel Poisson model.

2.3. Econometric Specification

Let t_{it} denote the number of tourists arriving in New Zealand from country *i* in time *t*. Based on the multiplicative form of the gravity equation, the specification used in this paper is the following random effects Poisson model:

$$E(t_{it} \mid \alpha_i, \mathbf{x}_{it}) = \exp(\gamma_i + \mathbf{x}'_{it}\beta) = \alpha_i \exp(\mathbf{x}'_{it}\beta) \tag{4}$$

where $\gamma_i = \ln \alpha_i$. The vector $\mathbf{x}'_{it}$ represents all the regressors:

$\mathbf{x}'_{it} = (1, \ln nzgdp_t, \ln gdp_{it}, \ln wgdp_t, \ln mig_{it}, dmig_{it}, \ln dist_i, dlan_i, \ln rer_{it})$. (See Table 1 for the definitions of the variables.) The conditional mean in (4) can be viewed either as one with effects that are additive before exponentiation or as one with multiplicative effects. Assuming that the random effects, α_i, are gamma-distributed with a mean 1 and a variance of η leads to an easy estimator to compute.[1] The resulting estimator is consistent under the assumption that the conditional mean is that given in (4) and that regressors are strongly exogenous.

[1] *See Cameron and Trivedi (1998) or (2005) for more details.*

2.3.3. Data

The data set is the same one used in Law, D., M. Genç, and J Bryant (2009). It contains data for a large panel of more than 190 countries on average for the years 1981 to 2006. Estimates of the foreign-born population in New Zealand come from Statistics New Zealand and are based on data from the 1981, 1986, 1991, 1996, 2001 and 2006 Censuses. To calculate exact values for the inter-censal years it would be necessary to have data on deaths and international movements by place of birth, which are not available. Therefore, migrant numbers in inter-censal years have been interpolated. Data on short term visitor flows by country (the proxy for tourism exports) are also available from Statistics New Zealand and can be disaggregated by reason for visit. These data are annual.

Data on language, and distance from New Zealand come from the Research Center in International Economics.[2] GDP data are obtained from either the IMF or the UN.

2.3.4. Variables

Table 1 summarises the explanatory variables.

Table 1 – Explanatory variables used in the model

Variable name	Definition
$lnmig$	Log of the number of migrants in New Zealand from a given country
$lnnzgdp$	Log of New Zealand's GDP (in 2006 $NZ)
$lngdp$	Log of foreign country's GDP (in 2006 $NZ)
$lnwgdp$	Log of world GDP (in 2006 $NZ)
$lndist$	Log of the distance between the foreign country's capital and Wellington
$dlan$	A dummy variable taking a value of one if English is not widely spoken in the foreign country.
$lnrer$	Log of the real exchange rate. Expressed so that an increase in this variable is associated with an appreciation of the New Zealand dollar.
$dmig$	Dummy variable taking a value of one if there are no migrants from the country

The dependant variable is the number of overseas short term visitors arriving in New Zealand from each country.

[2] http://www.cepii.fr/anglaisgraph/bdd/distances.htm

3. Preliminary Results

Results are presented in Table 2. It appears that migrants have a strong positive effect on tourism exports.

Table 2 – Tourism exports (holiday arrivals), 1981 to 2006

Variable	Coefficient (s.e)
$lnmig$	$.2341^{\dagger}$
	(0.1282)
$lnnzgdp$	$.9409^{**}$
	(0.2852)
$lngdp$	1.5153^{**}
	(0.2557)
$lnwgdp$	$-.6267^{*}$
	(0.3037)
$lndist$	-5.4935^{**}
	(1.2524)
$dlan$	-1.6796^{*}
	(0.7062)
$lnrer$	$.5866^{**}$
	(0.2104)
$dmig$	-.0403
	(0.3647)
Log Likelihood	-919577.24
Observations	5025
Countries	205

Notes – For definitions of the variables refer to Table 1. Cluster-robust standard errors are in parenthesis. Two stars (**) indicates that the coefficient is significantly different from zero at the 1% significance level, one star (*) indicates that it is significant at the 5% level, and a dagger (†) indicates that it is significant at the 10% level.

The estimated coefficients on Distance and the Non-English dummy are negative and statistically significant indicating that, all else equal, there will be fewer visitors from countries that are further away, and predominantly use a language other than English. The coefficient estimates on *log* variables are elasticities, so, the coefficient estimate on $lndist$ implies that a 1% increase in distance leads to a 5.5% decrease on the number of visitors. The coefficient estimate on $dlan$ implies that the number of visitors from a non-English speaking country are, on average, 81% lower. The coefficient estimates of the GDP variables are all statistically significant, and have the expected signs. Their coefficients are also interpreted as elasticities.

The variable $lnmig$ is the main variable this study is concerned with. The coefficient estimate on $lnmig$ is statistically significant at 7% significance level. Its magnitude implies that a 1% increase in immigrants from a country leads to a 0.23% increase in the number of visitors from that country, all else equal.

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