Trade, diaspora and migration to New Zealand

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Foreword

NZIER has always had a strong interest in understanding the way in which the New Zealand economy interacts with the rest of the world. We have a long history of producing research into trade liberalisation and globalisation. As the global economy becomes ever more complex, we are now turning our attention to issues such as services, investment, technology transfer and the role of people movement in promoting economic growth and productivity.

NZIER is delighted to continue this tradition by funding this important and innovative piece of research by David Law, Murat Genç and John Bryant into the links between trade flows and the movement of people across borders. This research was funded by NZIER in celebration of our 50th Anniversary in 2008.

During this very challenging period for the global economy, there has been a tendency for policy makers to implement inwards-focused policies aimed to protecting domestic jobs and promoting domestic economic activity. Such policies are politically popular, but can be economically inefficient and often come at the expense of deeper economic integration between countries.

One particularly topical area of policy discussion is the role of immigration in promoting economic growth. New Zealand has long been reliant on immigration to boost its population and to fill gaps in the labour market. And many Kiwis love to travel overseas to gain life and work experience. Given these continual inflows and outflows, it is interesting to consider how people movements might affect the New Zealand's exports and imports of goods and services, and thus how immigration policy might be used as a policy lever to boost our international linkages.

The paper uses empirical techniques to investigate the links between trade, migration and New Zealand's diaspora. It clearly shows that inwards and outwards migration has a positive effect on goods and tourism trade. This suggests that policy makers could design immigration policy with these links in mind in order to maximise the economic potential of migrants. If trade follows migration flows, then an important avenue for boosting New Zealand's integration with the global economy may be encouraging migrants from important trading partners.

NZIER congratulates the authors of this work. It should spark debate in the research and policy communities.

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About NZIER

The New Zealand Institute of Economic Research Inc is an independent non-profit organisation, founded in 1958, that uses applied economic analysis to provide business and policy advice to clients in the public and private sectors. It also funds Public Good research into important economic issues in order to advance the level of debate on these matters.

Authorship

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Any views expressed are those of the authors and do not necessarily reflect those of NZIER, the Commerce Commission or the University of Otago.

Executive summary

Finding ways to reduce the costs of international trade is a major part of lifting New Zealand's economic performance. One promising way of doing so is by using the business knowledge, language skills, and social and commercial networks of migrants. New Zealand is particularly well placed to do this, since one quarter of all New Zealanders are overseas-born, and New Zealand has an unusually large number of nationals living overseas (Bryant and Law 2004).

Testing whether migration does indeed boost trade involves numerous statistical difficulties. There are many factors, ranging from technological change to colonial links to macroeconomic conditions, that affect both migration and trade and hence obscure the causal relationship between them. However, by assembling a large, longitudinal cross-country dataset, and applying a battery of econometric models, we are able to deal with many of these difficulties.

We find that migration does indeed stimulate trade. According to our benchmark results, if New Zealand receives 10 percent more migrants from a particular country, New Zealand's merchandise exports to that country grow by 0.6 percent, and New Zealand merchandise imports from that country grow by 1.9 percent. These estimates fall within the range obtained in overseas studies. We find that the effect of migration is strongest for differentiated goods, and for trade with countries, such as developing countries, where transactions costs are highest. We also test for the effect of migration on tourism, and find that it is several times stronger than the effect of migration on merchandise trade.

The effect of migration on trade could be enhanced through policy. The greatest potential for new gains probably lies in policies towards immigrants in New Zealand, rather than New Zealanders overseas. This is partly because organizations such as Kea and the Ministry of Foreign Affairs and Trade have already been working with the diaspora for some time. It is also because the diaspora is concentrated in Australia, the United Kingdom, and the United States (Bryant and Law 2004), where the scope for further reducing transactions costs is low, whereas many immigrants in New Zealand come from countries, such as China and India, where transaction costs are high.

Selection criteria for non-family immigrants to New Zealand focus almost exclusively on filling skills shortages. The criteria could be broadened to include characteristics that are useful in international trade, such as foreign language skills or previous experience in an export business. Immigration promotion campaigns could be targeted at countries where there is significant export potential combined with significant cultural or institutional barriers to trade. Immigrants could be provided with the same sort of advisory services and encouragement to maintain connections with the home country as are provided to expatriate New Zealanders.

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1. Introduction

As a small country, New Zealand benefits greatly from access to the markets, technologies, and capital of other countries. But as a remote country, New Zealand faces special difficulties achieving access. Reducing barriers to exchange with the rest of the world is a promising means of lifting New Zealand's economic performance. It has therefore been a perennial goal of New Zealand policy makers.

One promising way of reducing barriers to exchange is migration. Almost a quarter of all New Zealanders are overseas-born[1], which is one of the highest migrant concentrations in the OECD. Moreover, New Zealand has an unusually large number of nationals living overseas (Bryant and Law 2004). Through their ability to speak languages, navigate legal systems, and draw on social and commercial networks their countries of origin and destination, migrants may be able to offset some of the effects of New Zealand's remoteness.

In this paper, we test whether migration has in fact reduced barriers to exchange. We test whether, all else equal, countries with larger stocks of migrants (whether overseas-born in New Zealand or New Zealand-born overseas) have more international trade with New Zealand. We consider merchandise exports and imports, and also tourism. Our models control 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, we also control for unobserved permanent characteristics of countries, and global trends that might stimulate both migration and trade. A further refinement is that we allow for the fact that some countries do not trade with New Zealand at all.

We find that migration does indeed boost trade. The effect on merchandise imports is larger than the effect on merchandise exports. The effect is also larger for countries that are more difficult for New Zealand to trade with: developing countries, and countries where English is not the dominant language. However, the strongest effects occur not with merchandise trade but with tourism.

Migrants' contribution to lowering trade costs has largely been an unintended consequence, rather than a specific objective, of New Zealand immigration policy. Instead, immigration policy has emphasized skill shortages. Applicants earn points for attributes that predict ability to quickly find employment, such as educational qualifications. They do not earn points for other attributes that predict ability to facilitate international linkages, such as foreign language skills. Similarly, evaluations of migrants' performance, and recommendations on the design of immigration policy emphasize labour market performance above all else.[2] By taking an overly narrow view of the economic contributions of migrants, New Zealand may be missing opportunities to maximize the economic benefits from migration.

[1] Data from the 2006 Census of Population and Dwellings, obtained from the Statistics New Zealand website www.stats.govt.nz.

[2] For instance, the main migration-related recommendation in a recent Treasury paper on 'International Connections and Productivity' is that policy makers "design immigration settings with a medium-term view to target skills and a net positive inflow" (Treasury 2009: 15).

2. Trends in migration and trade

Between 1981 and 2006 the number of overseas-born people usually resident in New Zealand rose from approximately 450,000 to 920,000, an increase of more than 100%.[3] As Table 1 shows, the sources of migrants also became more diverse, with particularly large increases in migrants from Asia and Africa. The data in Table 1 suggest that New Zealand is developing migrant communities from an increasingly wide variety of countries. For instance, the number of countries for which New Zealand had at least one thousand migrants increased from 28 in 1981 to 55 in 2006, and the number of countries for which New Zealand had at least 10 thousand migrants increased from 5 to 16.[4]

The dramatic changes in New Zealand's migrant population followed from changes in immigration policy. From the mid-1980s official preferences for "traditional" migrant sources were ended, and decisions were based mostly on personal characteristics such as qualifications and age (Goodwin, Bedford and Lidgard 1998). This provides partial reassurance that migration was not responding to trade *per se,* which would bias upwards our estimates of the effect of migration on trade.[5]

The number of New Zealand-born living outside the country, while not as large as the number of overseas-born living in the country, was just over half a million (or approximately 15% of the global New Zealand-born population) in 2000. A potentially important difference between New Zealand's diaspora and migrant stocks is that the diaspora are relatively more concentrated in a small number of English speaking countries. Indeed, in 2000 the number of countries for which New Zealand had diaspora greater than one thousand was 19. In only 4 of those countries was the diaspora greater than ten thousand.

New Zealand's imports and exports have also grown substantially over the period 1981-2006. Table 1 presents estimates based on data from the United Nations Commodity Trade Database (Comtrade). Trade values in Comtrade are reported in nominal US dollars; we have converted these into 2006 NZ dollars by multiplying by the NZ-US exchange rate, and then dividing by aggregate merchandise import and export price deflators.

As with migration, there is substantial geographic variation in growth rates. Trade with the United Kingdom, for instance, has increased relatively little, while trade with Asia and Africa have increased markedly. New Zealand has increased the number of countries with which it conducts substantial international trade. Between 1981 and 2006, the number of countries from which New Zealand imported goods worth at least $100 million (in 2006 NZ dollars) increased from 14 to 38. During the same period, the number of countries to which New Zealand exported goods worth at least $100 million increased from 24 to 39.[6]

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[3] To calculate these figures we assumed that census respondents whose birthplace was unspecified or undefined had the same probability of being foreign-born as respondents who did have a clear birthplace.

[4] Bryant and Law (2004) contains a more detailed analysis of trends in New Zealand's foreign-born population between 1981 and 2001.

[5] For more discussion on the direction of causation between migration and trade see Gould (1994: 310).

[6] Bryant, Genç, and Law (2009) contains a more detailed analysis of trends in New Zealand's trade between 1981 and 2006.

Table 1 New Zealand's Diaspora, migrants, exports and imports, by region, 1981-2006

	Diaspora by region (thousands)	Population of New Zealand by region of birth (thousands)			Exports by region (NZ$ 2006 millions)			Imports by region (NZ$ 2006 millions)		
	2000	1981	2006	Incr.	1981	2006	Incr.	1981	2006	Incr.
Australia	356	44	63	43%	1,856	6,784	266%	1,982	8,171	312%
East Asia	5	6	135	2150%	2,333	7,318	214%	2,183	10,065	361%
Pacific	6	58	136	134%	594	1,166	96%	132	132	0%
United Kingdom	58	249	244	-2%	1,612	1,694	5%	1,001	1,112	11%
Europe	26	49	75	53%	1,843	3,975	116%	1,313	5,913	350%
SE Asia	5	11	58	427%	832	2,954	255%	1,012	5,476	441%
Middle East	3	1	14	1300%	895	1,121	25%	714	2,132	199%
Africa	6	14	108	671%	305	1,308	329%	129	682	429%
North America	36	12	27	125%	1,841	5,101	177%	2,238	5,620	151%
South America	1	3	8	167%	305	1,212	297%	86	415	383%
South Asia	3	1	10	900%	43	311	623%	17	93	447%
Other & Unspecified	0	16	191	1094%	560	1,360	143%	193	872	352%
New Zealand	-	2,679	2,960	10%	-	-	-	-	-	-
Total	506	3,143	4,028	28%	13,018	34,304	164%	11,001	40,685	270%

Source: Population data from Statistics New Zealand unpublished census tabulations. Trade estimates calculated from the United Nations Statistics Division's Comtrade database. Diaspora data from the Global Migrant Origin Database. The imputation method used by the Gobal Migration Origin Database overstates the number of New Zealanders in countries with missing data. We modified their method, yielding estimates that were lower by approximately 21,000. The adjustments are described in the Appendix.

3. Mechanisms through which migrants could stimulate trade

Following Gould (1994), most authors postulate two mechanisms through which migration could stimulate trade between the host and origin countries: "transaction cost" effects, and "immigrant preference" effects.

3.1 Transaction cost effects

Migrants are expected to stimulate trade by lowering transaction costs. There are two related sets of reasons why immigrants might face lower transaction costs for trade with their country of origin. The first is that immigrants have superior knowledge of home country markets, languages, business practices, laws, and other matters related to trade. The second is that migrants may be able to participate in international networks, as exemplified by the networks of ethnic Chinese (Rauch and Trindade 2002). These networks can be conduits of information, and can deter opportunistic behaviour.

Transaction cost effects are generally expected to stimulate both exports and imports. Most authors argue that migrants' informational advantages are more important for differentiated goods than for homogenous goods, because of the greater information problems involved in the trade of differentiated goods. Most authors also argue that the trade-stimulating effect of migration is greatest when the host and origin countries have very different institutions, languages and cultures, and when alternative sources of information and contract enforcement are lacking, since this is when the special skills of migrants are most needed.

3.2 Immigrant preference effects

Immigrants are assumed to demand certain goods produced in their home countries, or similar to those produced in their home countries. These preferences are expected to boost imports to the host country but not exports from the host country. The effect is assumed to be more marked for differentiated goods than for homogenous goods. Some authors note that there may be a countervailing "immigrant substitution" effect. If there are sufficient immigrants in a country, these immigrants may begin to produce goods themselves rather than importing them (Dunlevy and Hutchison 1999, Girma and Yu 2002).

4. Literature Review

A growing number of studies have examined the effects of immigration on trade flows since the pioneering studies of Gould (1994) and Head and Ries (1998). Apart from Blanes (2005) and Blanes and Martín-Montaner (2006) who use an intra-industry-trade index as their dependent variable, all of these studies have used a gravity model, and have found a positive relationship between immigration and trade regardless of the different samples, specifications, and estimation methods used in them. However, the estimated magnitude of the elasticity of trade with respect to immigration differs greatly across these studies.

Table 2 summarises results from the twenty-four previous empirical studies of migration and trade that are published in academic journals. The studies cover eight host countries—the United States, Canada, the United Kingdom, France, Spain, Denmark, Australia, and Malaysia—and various trading partners, though in the case of Helliwell (1997) the trade question is between Canadian provinces and US states, and between different regions of France in the case of Combes et al (2005). Dunlevy and Hutchison (1999, 2001) use data from 1870 to 1910; all the other studies use more recent data. Half of these studies use trade data at the country level, the rest use state (U.S.) or province (Canada) or "department" (France) level data. Nearly all of the studies focus on the trade flows of English-speaking countries. The exceptions are Rauch and Trindade (2002), Blanes (2005), Combes et al. (2005), Blanes and Martín-Montaner (2006), Hong and Santhapparaj (2006), and White (2007a). Some studies use data from a single period, while others use time series techniques to combine data from several periods.

As is apparent from Table 2, the estimated magnitude of the immigration effect differs greatly across studies. If we focus on the studies that use country-level data, we observe that the immigrant elasticity of export ranges from 0.02 (Gould (1994)) to 0.57 (White (2007a)), implying that a 10% increase in migration leads to between 0.2% and 5.7% in exports. Similarly, the import elasticity ranges from 0.01 (Gould (1994)) to 0.88 (Hong and Santhapparaj (2006)), implying that a 10% increase in migration leads to between 0.1% and 8.8% increase in imports This variation is quite large, and can be due to the estimation technique (cross-section as opposed to panel estimation, for example), differences in specification, and samples. It is also interesting that the effect of migrants is not found to be consistently higher for imports than for exports, suggesting that the immigrant preference effects may not be as important as the transaction cost effects of immigrants in many cases.

Although different types of commodities (differentiated, homogeneous, consumer, producer, cultural) have been considered in the studies summarised in Table 2, none have looked at trade in services. In fact, we know of no studies that have looked at the effect of migrant stocks on exports of services, such as tourism, even though migration could plausibly lower transactions costs for trade in services in the same way that it lowers costs for trade in goods.

Table 2 The effect of immigration on exports and imports in previous empirical papers

Study	Sample	Export elasticity	Import elasticity
Gould (1994)	US and 47 trade partners; 1970-1986	0.02	0.01
Helliwell (1997)	Trade between Canadian provinces and US states, 1990	0.34	0.06[ns]
Head and Ries (1998)	Canada and 136 trade partners; 1980-1992	0.10	0.31
Dunlevy and Hutchinson (1999,2001)	US and 17 trade partners; 1870-1910	0.08	0.29
Girma and Yu (2002)	UK and 48 trade partners; 1981-1993	0.16[a]	0.10[a]
Rauch and Trindade (2002)	63 countries; 1980, 1990	0.21/0.47[b]	0.21/0.47[b]
Wagner, Head, and Ries (2002)	5 Canadian regions and 160 foreign countries; 1992-1995	0.013	0.092
Co et al. (2004)	US state exports, 1993, 28 countries	0.27 - 0.30	
Bardhan and Guhatkakurta (2004)	US state exports, 1994-1996, 51 countries	0.24-0.26[c] 0.06-0.09[d]	
Blanes (2005)	Total trade between Spain and 42 trade partners, 1991-1998	0.21[e]	0.21[e]
Combes *et al* (2005)	94 French “departments”, 1993	0.16 or 0.25[f]	0.16 or 0.25[f]
Herander and Saavedra (2005)	US state exports, 1993-1996, 36 countries	0.18	
Mundra (2005)	US with 47 trade partners, 1973-1980	+[g]	+[g]
Blanes and Martín-Montaner (2006)	Spain and 48 non-EU trade partners, 1988-1999	0.47[h]	0.47[h]
Dunlevy (2006)	US average state exports, 1990-1992, 87 countries	0.24 - 0.47	
Hong and Santhapparaj (2006)	Malaysia and 16 trade partners, 1998-2004	0.53	0.88
White (2007a)	Denmark and 170 trade partners, 1980-2000	0.23 - 0.57	0.19 - 0.33
White (2007b)	US and 73 trade partners, 1980-2000	0.11	0.13
White and Tadesse (2007)	Australia and 101 trade partners, 1989-2000	0.47	0.18
Bandyopadhyay et al. (2008)	US state exports, 29 countries, 1990, 2000	0.14	
Tadesse and White (2008a)	US state exports, 75 countries, 2000	0.11	
Tadesse and White (2008b)	US state exports, 75 countries, 2000	0.05	
White and Tadesse (2008)	US state exports, 75 countries, 1998-2001	0.12	

[ns] not statistically significant

[a] Trade with non-Commonwealth countries. The export and import elasticities with respect to immigrants are not statistically significant for trade between UK and Commonwealth countries.

[b]The estimate of 0.21 applies to homogenous goods, and 0.47 to differentiated goods; insufficient data were included in the article to allow the calculation of an overall elasticity. No distinction is made between imports and exports.

[c] West Coast, [d] East Coast.

[e] The coefficient of *log(immigrant stock)*, the dependent variable is the logistic transformation of GL index if intra-industry trade.

[f] Total trade elasticity, 0.26 if both immigrant and emigrant effects are included.

[g] Elasticities are not estimated as it is semiparametric estimation. The effect of immigration on exports is not necessarily positive for intermediate goods.

[h] The coefficient of *log(immigrant stock)*, the dependent variable is the logistic transformation of Brülhart’s MITT A index if intra-industry trade.

[k] “Exports” refers to exports from Canada to Taiwan, “imports to imports to Canada from Taiwan.

4.1 The gravity model

It is not surprising that the previous studies have used a gravity model for the specification of their models. The gravity model is one of the most commonly used specifications in empirical trade research, and has been accepted as being ‘extremely successful empirically,’ in its ability to explain variance in bilateral trade volumes (Deardoff 1984). Leamer and Levinsohn (1995) state that gravity models ‘have produced some of the clearest and most robust empirical findings in economics.’

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

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

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

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

which can be viewed as

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

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 ‘augmented’ gravity models.

Although the gravity model has had a huge empirical success for a long time, a theoretical foundation in economics was not provided until Anderson (1979) derived the gravity equation from a model that assumed product differentiation. Bergstrand (1985, 1989) then associated the gravity equation with simple monopolistic competition. Helpman and Krugman (1985) justified the gravity model in a differentiated product framework with increasing returns to scale. Deardoff (1998) has shown that the gravity model characterizes many models and can be justified from standard trade theories. Anderson and van Wincoop (2003) derived an operational gravity model from a CES expenditure system. Helpman et al. (2008) has recently generalized their model by accounting for firm heterogeneity and fixed trade costs, and also for asymmetries between the volume of exports from j to i and the volume of exports from i to j.

4.2 The problem of zero trade

The standard approach to estimating the gravity model is to use the log-linear model in (3). Although this is very simple to implement, trade data often contain observations with zero trade which creates a problem since the logarithm of zero is not defined. Because the proportion of observations with zero trade is often quite significant, the way these zeros are handled is very important.

The elementary approach to handle the presence of zero trade is simply to discard such observations and use only the observations with a positive level of trade. Although this induces a sample selection bias if the zeros are not randomly distributed, many studies in Table 2 use this approach. (For example, Gould (1994), Helliwell (1997), Girma and Yu (2002), Mundra (2005), Hong and Santhapparaj (2006), White (2007b), and Bandyopadhyay (2008).)

A second approach is to add a constant factor, usually 1, to the volume of trade before taking its logarithm. Dunlevy and Hutchinson (1999, 2001), Dunlevy (2006), and Combes et al. (2005) use this approach. This is justified on the grounds that *ln(1+trade)≈ln(trade)* for large values of *trade*, and *ln(1+trade)≈trade* for small values of *trade*, approximating the semi-log Tobit relationship (Eichengreen and Irwin (1995)). Although this fixes the problem and allows estimation of (3) in a simple fashion, this procedure will generally lead to inconsistent estimators of the parameters of interest (Silva and Tenreyno (2006)). It also makes the results sensitive to the units in which the volume of trade is measured (Head and Ries (1998)).

A third approach is to treat zero trade as a corner solution and use a Tobit estimation procedure. Head and Ries (1998), Rauch and Trindade (2002), White (2007a), Tadesse and White (2008a, and 2008b) use this approach. Although the Tobit estimator deals with zero trade in a satisfactory way from an econometric point of view, it is very questionable in the presence of heteroskedastic or non-normal residuals as the MLE Tobit estimator is inconsistent in these circumstances.

Another approach is to treat the occurrence of zero trade as non-random and use a Heckman-type sample selection model. In this approach, a country's decision to trade with a potential trade partner is explicitly modeled, allowing one to estimate the probability of countries to trade. (Heckman (1979.) Wagner, Head, and Ries (2002) is the only study in Table 2 where a Heckman procedure is used. Helpman et al. (2008) have recently proposed a theoretical model that yields a generalized gravity equation that accounts for self-selection into export markets, and have suggested estimating the gravity equation with a correction for the probability of countries to trade.

Another approach that is capable of dealing with zero trade is the Poisson Pseudo-Maximum Likelihood (PPML) estimator suggested by Silva and Tenreyno (2006). They propose estimating the gravity equation directly from its non-linear form by using an exponential regression function. This removes the need to linearise the model by taking logarithms, eliminating the problem of zero trade.

5. Methodology

Our approach, like previous econometric tests of the effect of migration on trade, is based on a gravity model of trade. Let m_i be the value of New Zealand's imports from country *i* (or New Zealand's exports to country *i*). If we define the product of the economic mass of countries *i* and *j*, E_iE_j in equation (3), as the GDP of country *i* multiplied by New Zealand GDP as a fraction of world GDP, and denote it Y_i, we can rewrite equation (3) as

$$\ln m_i = \beta_0 + \beta_Y \ln(Y_i) + \beta_3 \ln D_i, \tag{4}$$

where D_i is the distance between New Zealand and country *i*. As explained in Section 4, it is common to "augment" the gravity model by including factors such as oil prices, real exchange rates, common languages, common borders, membership of trade blocs, and colonial ties. If we let $\boldsymbol{X}_i$ denote all such factors, together with lnD_i and lnY_i, equation (4) can be expressed as

$$\ln m_i = \beta_0 + \mathbf{X}_i\boldsymbol{\beta}. \tag{5}$$

For studies of migration and trade, the key variable in $\mathbf{X}_i$ is one measuring the number of migrants from each potential trading partner living in the country of interest. We also include a variable measuring the number of New Zealanders living in each potential trade partner country (our diaspora). The only other study we are aware of that has attempted to include such a variable is one on overseas Chinese (Rauch and Trindade, 2002).

5.1 Unobserved heterogeneity

The variables available to us cannot capture all influences on New Zealand's trade. In other words, there is likely to be unobserved heterogeneity across our sample. Applying ordinary cross-sectional techniques in the presence of unobserved heterogeneity can lead to incorrect standard errors and biased coefficient estimates.

Use of panel data, however, permits models of the form

$$\ln m_{it} = \alpha_i + \gamma_t + \mathbf{X}_{it}\boldsymbol{\beta} + u_{it}, \tag{6}$$

where the subscript refers to country *i* as before, *t* refers to year *t*, α_i is an unobserved country-specific effect that represents the permanent cross-country heterogeneity, γ_t captures year-specific effects, and u_{it} is a time-varying idiosyncratic error.

If the α_i are assumed to be uncorrelated with the explanatory variables, then Equation (6) can be estimated using a Random Effects approach. The assumption of zero correlation is, however, difficult to justify in our case. No such assumption is required under a Fixed Effects approach. Under Fixed Effects, however, it is not possible to obtain coefficients for variables that are constant over time, such as Language.

Previous econometric studies of migration and trade have used either ordinary cross-sectional techniques or Fixed Effects. There is, however, an alternative approach, referred to as Correlated Random Effects, that avoids the zero-correlation assumption and allows the inclusion of variables that are fixed over time. Under Correlated Random Effects, the correlation between the country-specific fixed effect α_i and the explanatory variables is explicitly modeled using the expression

$$\alpha_i = \mathbf{X}_{i1}\boldsymbol{\lambda}_1 + \mathbf{X}_{i2}\boldsymbol{\lambda}_2 + \ldots + \mathbf{X}_{iT}\boldsymbol{\lambda}_T + \eta_i \tag{7}$$

where the $\boldsymbol{\lambda}_i$ are vectors of "projection coefficients" and η_i is a true random effect that is uncorrelated with the explanatory variables. We assign the same weight to all time periods, so that

$$\boldsymbol{\lambda}_1 = \boldsymbol{\lambda}_2 = \ldots = \boldsymbol{\lambda}_T = \boldsymbol{\lambda} , \tag{8}$$

and

$$\alpha_i = T\overline{\mathbf{X}}_i\boldsymbol{\lambda} + \eta_i , \tag{9}$$

so that the country-specific effects are determined by *time* averages ($\overline{\mathbf{X}}_i$). Substituting this expression into Equation (6) (and absorbing T, a constant, into $\boldsymbol{\lambda}$) gives

$$\log m_{it} = \gamma_t + \mathbf{X}_{it}\boldsymbol{\beta} + \overline{\mathbf{X}}_i\boldsymbol{\lambda} + \eta_i + u_{it} , \tag{10}$$

which can be estimated using Random Effects.

5.2 Selection bias

Equation 10 does not allow for zero trade. In practice, however, 28% of our observations for imports are zeros, as are 19% of our observations for exports. Following previous studies of migration and trade, we interpret the zeros to mean that observed trade values emerge from a two-step process. Countries in effect decide whether to trade, and then decide how much to trade (Head and Ries 1998; Dunlevy and Hutchinson 1999: fn20; Wagner, Head, and Ries 2002: 518). We adopt a Heckman (1979) selection model:

$$z_{it}^* = \gamma_i^0 + \mathbf{X}_{it}\boldsymbol{\beta}^0 + \overline{\mathbf{X}}_i\boldsymbol{\lambda}^0 + \eta_i^0 + u_{it}^0 \tag{11a}$$

$$z_{it} = \begin{cases} 0, & z_{it}^* < 0 \\ 1, & z_{it}^* \geq 0 \end{cases} \tag{11b}$$

$$\log m_{it} = \gamma_i^1 + \mathbf{X}_{it}\boldsymbol{\beta}^1 + \overline{\mathbf{X}}_i\boldsymbol{\lambda}^1 + \eta_i^1 + u_{it}^1 , \qquad z_{it} = 1 \tag{12}$$

We assume that $u_{it}^0 \sim N(0,1)$, $u_{it}^1 \sim N(0,\sigma^2)$ and $\text{cov}(u_{is}^k, u_{it}^k) = 0$ where $s \neq t,\ k = 0,1$. However, we allow for the possibility that $\text{cov}(u_{it}^0, u_{it}^1) = \rho \neq 0$. Equations (11a) and (11b) together make up the "selection equation," while Equation (12) is the "trade equation". We do not have 'exclusion restrictions' in our specification of the model, that is, both the selection and the trade equations have exactly the same set of regressors. Although exclusion restrictions are necessary in cross-section studies, they are not necessary, in general, in panel estimation. (Lee 2002: 163.) If $\rho \neq 0$, then simply using Equation (10) on the sub-sample with non-zero trade will lead to biased estimates. This is in fact often what the international literature on migration and trade has done. Where selection models have been applied, it has been in a cross-sectional rather than panel context. (The studies that estimated gravity models in the wider international trade literature applied pooled cross-section techniques even when they were using panel data.)

We carried out the estimation of Equations (11) and (12) using the statistical package LIMDEP 9.0. We treated η_i^1 and η_i^0 as random coefficients and applied maximum simulated likelihood methods, fitting a random parameters probit model first, and then using the results to fit the trade equation.

Finally, following previous studies, we use the logs of migrant stocks in $\mathbf{X}$. In some cases, however, migrants equals zero, meaning that the log is undefined. Simply omitting these cases could potentially create a selection bias. We therefore adopted the approach used by Wagner, Head, and Ries (2002) and included a dummy variable Zero Migrants. When there was a positive number of migrants, we set Zero Migrants equal to 0. When there were no migrants we set Zero Migrants equal to 1 and set the log Migrants variable equal to 0. The Diaspora variable raised the same problem, and we applied the same solution.

5.3 Data

We have assembled data for a large panel of more than 190 countries on average for the years 1981 to 2006. As discussed, the reason for assembling a large panel dataset is to address problems of unobserved heterogeneity and selection bias.

Data on imports and exports come from the United Nations Statistics Division's Comtrade Database. The UN obtains estimates of New Zealand imports and exports from Statistics New Zealand. We treat the data as complete. If no trade is reported between New Zealand and a given country in a given year, we assume that the true value for that year was zero.

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, we have interpolated migrant numbers in inter-censal years. Data on short term visitor flows by country (our 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 the New Zealand diaspora come from the Global Migrant Origin Database.[7] Because of the imputation method used, the original estimates in the database overstate the number of New Zealanders in countries with missing data. We have adjusted these estimates downwards, as described in the Appendix. Data are only available for (approximately) the year 2000, the time of the most recent global census round. Our Diaspora variable is thus only a proxy for the true number of expatriate New Zealanders in a country in any given year. This means that coefficients on the Diaspora variable are not directly comparable with coefficients on the migration variable. (The New Zealand census is also more accurate than most countries' censuses, so the Migrant Stock variable contains less measurement error than the Diaspora even in 2000.)

[7] http://www.migrationdrc.org/research/typesofmigration/global_migrant

Data on language, and distance from New Zealand come from the Research Center in International Economics.[8] World Trade Organisation membership information is available directly from the WTO.[9] Most of our other important variables, such as each country's GDP and population, come from either the IMF or the UN.

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

[9] http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm

5.4 Variables

Table 3 summarises the variables.

Table 3 Variables used in the models

Variable name	Definition
Migrants	Log of the number of migrants in New Zealand from a given country
Diaspora	Log of the number of New Zealand-born living in a given country
Mass	A variable capturing economic mass. It is equal to the log of (NZ GDP x foreign country's GDP) / world GDP). All values are in 2006 $NZ
Population	Log of a foreign country's population
Distance	Log of the distance between the foreign country's capital and Wellington
Non-English	A dummy variable taking a value of one if English is not widely spoken in the country.
WTO Member	A dummy variable taking a value of one if the country is a member of the World Trade Organisation
Real Exchange Rate	Log of the real exchange rate. Expressed so that an increase in this variable is associated with an appreciation of the New Zealand dollar.
Zero Migrants	Dummy variable taking a value of one if there are no migrants from the country
Zero Diaspora	Dummy variable taking a value of one if there are no New Zealand-born in the country
Average Migrants	The average value over time of the Migrants variable
Average Mass	The average value over time of the Mass variable
Average Population	The average value over time of the Population variable
Average Real Exchange Rate	The average value over time of the Real Exchange Rate variable

6. Results

All results presented throughout this section are generated using Correlated Random Effects models. Year and country specific effects are included in all specifications. We do not, however, present the coefficients for these.[10] We use one and two stars (*) to denote significance at the 5% and 1% level respectively, and a dagger (†) to denote significance at the 10% level.

6.1 Merchandise Trade

Exports

Table 4 gives results for merchandise trade. In the selection equation for exports the estimated coefficients on Mass and Population are both positive and statistically significant at conventional levels, indicating that, all else equal, higher values for these variables imply a higher probability that trade between New Zealand and a given country takes place. As this is a probit model, however, the size of the increment in the probability depends on the country's characteristics.

The estimated coefficients on Distance, the Real Exchange Rate and the Non-English dummy are all negative and statistically significant indicating that, all else equal, New Zealand is less likely to trade with countries that are further away, have higher real exchange rates, and predominantly use a language other than English. The coefficient estimates on Migrants and Diaspora, the variables of most interest to us in this study, are both positive and significant.

In the trade equation for exports the estimated coefficients on Mass, Population, WTO Membership, and the Real Exchange Rate are positive. The positive relationship between the real exchange rate and exports is particularly interesting; it suggests that exports adjust with a lag to movements in the real exchange rate, in line with the well known J-curve effect. The estimated coefficients on Distance and the Non-English and Zero Diaspora dummies are negative. As Mass, Population, Distance, and the Real Exchange Rate are in logs the estimated coefficients associated with these variables are elasticities. The coefficient on Population of 1.1284 for example implies that, all else equal, increasing a country's Population by 1% would lead to a 1.13% increase in exports to that country.

The coefficient of 0.4030 on WTO membership implies that, all else equal, New Zealand exported on average around 40% more to members of the World Trade Organisation over the period 1981 to 2006 than it did to non members.

The estimated coefficient on Migrants implies that on average a 1% increase in the stock of migrants from a given country would result in an increase in exports to that country of around 0.06%. The Diaspora variable, however, is not statistically significant.

Imports

In the selection equation for imports the estimated coefficient on Migrants suggests that increasing the number of migrants from a given country will, all else equal, increase the probability that New Zealand imports from that country. Increasing our diaspora in a particular

[10] Though they are available from the authors on request.

country however does not appear to affect the probability that New Zealand imports from that country.

In the trade equation for imports the estimated coefficient on Migrants is highly significant and implies that, on average, a 1% increase in the stock of migrants from a given country would result in an increase in imports from that country of around 0.19%. The diaspora are also important for New Zealand's imports. On average, a 1% increase in our diaspora in a given country would result in an increase in imports from that country of around 0.10%.

Table 4 Merchandise trade, 1981 to 2006

Variable	Exports Selection	Trade	Imports Selection	Trade
Migrants	0.2256** (0.0397)	0.0637* (0.0253)	0.1234* (0.0507)	0.1912** (0.0266)
Diaspora	0.0560* (0.0269)	0.0028 (0.0098)	0.0291 (0.0221)	0.1028** (0.0109)
Mass	0.2739** (0.0750)	0.6314** (0.0358)	0.2088** (0.0627)	0.6694** (0.0415)
Population	0.8107** (0.3019)	1.1284** (0.1136)	1.1460** (0.3509)	0.1857 (0.1455)
Distance	-0.7066** (0.1537)	-2.5961** (0.0495)	-0.6570** (0.1317)	-1.8830** (0.0550)
Non-English	-0.3866** (0.0965)	-0.0751† (0.0405)	0.1640* (0.0794)	0.3215** (0.0467)
WTO Member	0.1663 (0.1150)	0.4030** (0.0388)	0.1201 (0.0877)	0.2973** (0.0415)
Real Exchange Rate	-0.1020** (0.0214)	0.0396** (0.0104)	-0.0004 (0.0256)	0.0981** (0.0142)
Zero Migrants	0.1308 (0.1035)	0.2261** (0.0711)	0.2135† (0.1258)	0.4940** (0.1380)
Zero Diaspora	-1.0742** (0.1049)	-0.5345** (0.0589)	-0.1791* (0.0905)	0.1456* (0.0709)
Average Migrants	0.2125** (0.0457)	0.2121** (0.0279)	0.4137** (0.0531)	0.1972** (0.0298)
Average Mass	0.2343** (0.0851)	0.2710** (0.0394)	0.1120 (0.0712)	0.5820** (0.0445)
Average Population	-1.1671** (0.3019)	-1.3490** (0.1136)	-1.2794** (0.3519)	-0.6289** (0.1463)
Average Real Exchange Rate	0.0059 (0.0254)	-0.1180** (0.0131)	0.0115 (0.0292)	-0.1546** (0.0165)
Log Likelihood	-1093.254	-9434.440	-1315.687	-8883.670
Observations	5025	4076	5025	3602
Countries	205	201	205	199

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. Dependant variables are in 2006 New Zealand dollars. 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.

6.2 Trade in tourism

Previous studies of the effect of migration on trade have looked exclusively at merchandise trade. In this section we examine the effect of migrants and diaspora on an important component of the international services trade: tourism.

Ideally, for our dependant variables we would like to use data on expenditure by overseas visitors in New Zealand (tourism exports) and by New Zealanders in the countries they choose to visit (tourism imports). Unfortunately, such data are only available for a small subset of countries.

Comprehensive data are, however, available on the number of overseas visitors arriving in New Zealand from each country and the numbers of New Zealanders visiting each country. Further, this data can be disaggregated by purpose of visit. We therefore use short term visitor numbers for the purpose of "tourism/holiday" to proxy for tourism export and import expenditures. Most visits to New Zealand are for tourism or similar purposes.

Results are presented in Table 5. It appears that both migrants and the diaspora have a strong positive effect on the exports and imports of tourism. Indeed the coefficient estimates for both variables in the trade equations are much higher than the corresponding results for merchandise trade. Appendix Table 1 shows similar results for total arrivals and departures.

Table 5 Trade in tourism (holiday arrivals and departures), 1981 to 2006

Variable	Exports		Imports	
	Selection	Trade	Selection	Trade
Migrants	0.0060	0.2252**	0.0433	0.4185**
	(0.0383)	(0.0070)	(0.0342)	(0.0080)
Diaspora	0.0265	0.1349**	0.0705**	0.2038**
	(0.0217)	(0.0055)	(0.0192)	(0.0056)
Mass	0.1900**	0.4400**	0.1622**	0.1762**
	(0.0648)	(0.0148)	(0.0552)	(0.0200)
Population	0.0812	-1.0752**	0.7225**	-0.3615**
	(0.2671)	(0.0498)	(0.2128)	(0.0553)
Distance	-1.9820**	-2.0152**	-1.7208**	-2.0210**
	(0.1416)	(0.0270)	(0.1244)	(0.0269)
Non-English	-0.4137**	-0.3800**	-0.4176**	-0.3173**
	(0.0843)	(0.0226)	(0.0737)	(0.0230)
WTO Member	0.0663	0.2172**	0.1367*	0.1226**
	(0.0833)	(0.0203)	(0.0688)	(0.0195)
Real Exchange Rate	-0.0169	0.0122†	-0.0232	0.1200**
	(0.0185)	(0.0064)	(0.0197)	(0.0062)
Zero Migrants	-0.1143	0.3796**	0.1283	0.7321**
	(0.0941)	(0.0553)	(0.1206)	(0.0936)
Zero Diaspora	-0.4132**	0.3227**	-0.3836**	0.6094**
	(0.0845)	(0.0379)	(0.0858)	(0.0431)
Average Migrants	0.3041**	0.1264**	0.3668**	-0.0176†
	(0.0427)	(0.0094)	(0.0399)	(0.0106)
Average Mass	0.5610**	0.3917**	0.3767**	0.2078**
	(0.0767)	(0.0172)	(0.0629)	(0.0215)
Average Population	-0.4955†	0.5867**	-1.0176**	0.1753**
	(0.2696)	(0.0504)	(0.2138)	(0.0558)
Average Real Exchange Rate	0.0476*	0.0440**	-0.0211	-0.0790**
	(0.0221)	(0.0076)	(0.0230)	(0.0078)
Log Likelihood	-1457.830	-5878.512	-1595.607	-4843.294
Observations	5025	3686	5025	3053
Countries	205	201	205	194

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. 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.

6.3 Extensions

In this section we extend our model in several ways. Theory suggests, and empirical studies largely confirm, that the effect of migration on trade varies with the goods being traded and the countries involved. We examine this for the case of New Zealand by re-estimating our results for merchandise trade using imports excluding oil, on the grounds that imports are channelled through a few large companies, and also because petroleum products are homogeneous goods which pose fewer of the transactional difficulties that migrants are expected to alleviate. Our expectation is that the coefficients on the Migrants and Diaspora variables should be larger in the specifications excluding oil than they are in the benchmark specifications.

Results are shown in Table 6. In particular we present in this table coefficient estimates on our Migrants and Diaspora variables from the various trade equations we obtain (when we adjust either our sample or model) for easy comparison. The first row of the table (benchmark results) gives the coefficient estimates on the Migrants and Diaspora variables from Table 4. There appears evidence to suggest that migrants do indeed have a stronger effect on trade the more differentiated the goods traded are. The full set of results is available as Appendix Table 2.

Table 6 Extensions

Variable	Migrants		Diaspora	
	Exports	Imports	Exports	Imports
Benchmark results	0.064	0.191	0.003	0.103
Excluding oil		0.266		0.128
English	0.055	0.047	0.042	0.176
Non-English	0.064	0.214	0.072	0.106
High income	0.010	0.100	0.014	0.195
Low income	0.069	0.207	0.007	0.053
Diminishing returns	Yes	No	No	Yes

As with previous studies, we also hypothesise that migrants have a stronger effect on trade when they come from a non-English-speaking country, because the migrants' language skills are then needed, and because language proxies for cultural and institutional differences from New Zealand. Similarly, our hypothesis would be that our diaspora has a stronger effect on trade when they are located in non-English speaking countries for the same reasons. We test for such effects by interacting our Migrants and Diaspora variables with our language variable.

Again results are presented in Table 6. There is evidence that migrants from (and our diaspora in) non-English speaking countries do indeed have a stronger effect on trade than their counterparts from (in) English speaking countries. In three out of four cases the estimated coefficient on the migrant variables is higher in the non-English than English case. The full set of results is available as Appendix Table 3.

We also hypothesise that migrants have a stronger effect when they come from a low-income country (having controlled for the size of the countries' GDPs), since low income proxies for cultural and institutional differences, and for difficulties in obtaining information and enforcing contracts (see for example, White (2007b)). By the same reasoning we also expect our diaspora to have a stronger effect on trade when they are located in a low-income country. We test for this by interacting our Migrants and Diaspora variables with a low-income variable.

Table 6 shows there is evidence to suggest our hypothesis holds for migrants. In the case of our diaspora however results suggest the opposite – that our diaspora actually may have a greater effect on trade when they are located in high-income countries. We suspect, however, that this may be a statistical artefact. The diaspora variable contains much larger measurement errors for low-income countries, because of the poor quality of these countries' data on foreign born. (This problem does not affect the migrant variable, because data for all countries come from the New Zealand census.) The full set of results is available as Appendix Table 4.

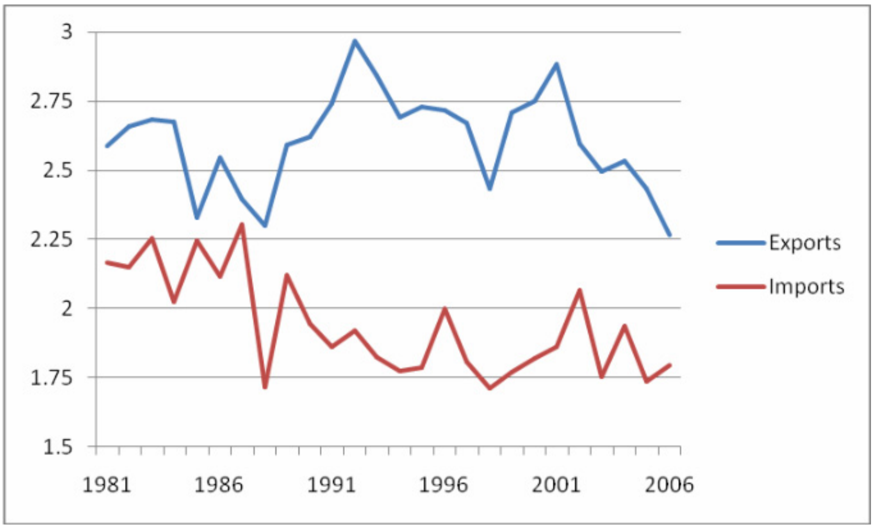
We examine how the size of the number of migrants and diaspora affects the elasticity of trade with respect to migration. We do this by adding the square of our Migrants and Diaspora variables to the regressions. This is equivalent to assuming that the elasticity of trade with respect to migration declines linearly with the log of the number of migrants; that is. the idea being tested here is whether there are diminishing returns for trade as the level of migrants rises.

Table 6 shows mixed results for diminishing returns to trade from migrants and diaspora. The full set of results is available as Appendix Table 5.

Finally, we examine how the trade retarding effects of distance have changed over time. We do this by interacting each of our year effects (time dummies) with distance. Figure 1 shows how the coefficient on distance in our trade equations for merchandise trade varies between 1981 and 2006. It appears as though the effect of distance on exports has remained relatively constant over time while the negative effect of distance on imports has actually declined.

It is also interesting to note that the effect of distance on imports is consistently less than on exports over the entire period. This may in part simply be due to the nature of the goods we trade being different for exports than imports, or that our import partners are closer on average than our export partners. The apparent level shift in the effect of distance on imports over time could well be related to the economic reforms of the mid to late 1980s, which removed many of the import barriers previously in place. The absence of a similar fall in the effect of distance on our exports could similarly be an artifact of our relative openness, compared to a number of our trading partners that were slower to reform in this area.

Figure 1 The effect of distance on trade over time



7. Discussion

It is plausible that the international exchange of people facilitates the international exchange of goods and services. Subjecting this idea to formal testing is, however, difficult. There are many factors, ranging from technological change to colonial links to macroeconomic conditions, that affect both migration and trade and hence obscure the causal relationship between them. In this paper, we have taken numerous measures to mitigate confounding effects from other variables. We have controlled for observable determinants of trade and migration, such as distance, by treating migration as a covariate within a gravity model of trade. (The gravity model raised technical issues of its own, which we have dealt with using a Heckman selection model.) By applying panel data techniques and 26 years' worth of data, we have controlled for unmeasured, long-term, country-specific determinants of trade and migration such as colonial links. We have also controlled for any unmeasured global trends, such as improvements in communications technology, that have affected trade and migration in all countries.

Our results indicate that migration does indeed stimulate trade. In our benchmark specification, merchandise exports from and imports to New Zealand both have a statistically significant relationship with numbers of migrants in New Zealand; imports also have a statistically significant relationship with numbers of New Zealanders overseas. Based on our results, if New Zealand receives 10 percent more migrants from a particularly country, New Zealand's exports to that country grow by 0.6 percent, and New Zealand imports from that country grow by 1.9 percent. These estimates fall within the range obtained in overseas studies.

Our results suggest that migration stimulates imports more than exports. Some overseas studies have also found a stronger effect for imports than for exports, but others have obtained the opposite result. The variability in research findings may reflect the fact that some studies, such as ours, have controlled for a wider range of confounding factors than others. It may also reflect genuine cross-country differences in the goods being imported and exported. Perhaps the types of goods that New Zealand imports involve greater information problems of the sort solved by migrants than the types of goods that New Zealand exports.

Consistent with previous literature on migration and trade, we find that the effects of migration are more pronounced for developing countries and for differentiated (in our case, non-oil) products. These are attractive properties. The economies of developing countries have been growing faster than those of rich countries, making them valuable markets to have access to. Commentators have argued for decades that New Zealand needs to increase its exports of differentiated products.

A novel feature of our modeling is that, as well as overseas-born people in New Zealand (the Migrant variable), we include New Zealand-born people overseas (the Diaspora variable.) The estimated coefficients for the Migrant variable are typically higher than those for the Diaspora variable. Taken at face value, this implies that bringing migrants from particular country to New Zealand has a greater impact on trade than sending migrants to that country from New Zealand. However, the differences in the coefficient estimates may be a statistical artifact of differences in the quality of the data. Although the data for the Diaspora variable are the best that are available, they differ from the data for the Migrant variable in that they contain substantial measurement error and refer to a single point in time. The results for the Diaspora variable are best treated as supporting evidence for the general idea that migration affects trade.

Another innovation in our analysis is that we examine the effect of migration on tourism. We find that the effect on tourism is several times stronger than the effect on merchandise trade. Tourism is a vital industry for New Zealand. The strong effect for tourism is *not* an artifact of migrants being misclassified as tourists: tourism flows dwarf migration flows. Without additional data, we can only speculate on reasons for the strong effect. It might be because migrants' country-specific knowledge of things such as food, language, and protocols are particularly important in tourism. It might also be because migrants transmit a positive image of New Zealand to their origin countries.

Our research suggests directions for future research and evaluation. Studies probing why migration simulates imports more than exports, and tourism more than goods, would be useful. Such studies would provide insights into the mechanisms responsible for the link between migration and trade, and hints on how the trade-stimulating effects of migration could be enhanced. Analysis of individual-level data on migrants would help identify the types of migrants most likely to contribute to international trade. Economic evaluations of migration policies traditionally focus on labour market effects, with some attention paid to fiscal effects, and little or no attention paid to international trade. Given the evidence that migration stimulates trade, and the importance of trade to the New Zealand economy, evaluations should include trade effects.

Our research also raises the question of how policies could be reshaped to take greater advantage of the trade-enhancing effects of migration. We suspect that there is greater scope for boosting the trade impact of migrants in New Zealand than for boosting the impact of the New Zealand diaspora. The benefits of tapping into New Zealand's diaspora have been recognized for some time, and organizations such as the Ministry of Foreign Affairs and Trade and Kea have already shown considerable ingenuity in developing networks, awards, and so forth. In addition, the geographical distribution of New Zealand's diaspora makes it poorly suited to overcoming barriers to international trade. The diaspora is highly concentrated in countries, such as Australia, the United Kingdom, and the United States (Bryant and Law 2004), where transactions costs are already relatively low, while many migrants in New Zealand come from countries where transactions costs are high, such as China and India. Finally, democratic countries such as New Zealand place few constraints on who emigrates and where they go to, which leaves the government with few policy levers.

Immigration to New Zealand by non-citizens is, in contrast, something that the government already tries to fine tune for economic purposes. Some aspects of the selection procedures already recognize the potential for migrants to boost trade. For instance, a potential immigrant applying under the entrepreneur subcategory of the business migrant category receives credit if his or her business is involved in exports.[11] However, business migrants account for only about 8 percent of all non-family migrants (Statistics New Zealand 2008: Table 1). Most migrants come to New Zealand under the skilled migrants category. Criteria for this category focus squarely on filling skills shortages, and include things such as work experience, job offers, and educational

[11] The criteria used by the business migrant and skilled migrant categories are described in the Immigration New Zealand website www.immigration.govt.nz.

qualifications. There is no attempt to select for characteristics, such as previous involvement in exporting or fluency in a foreign language, that are specifically relevant to international trade. Selection criteria could be expanded to include such characteristics. Another way in which the government might maximize the trade benefits from immigration would be to encourage migration from countries where there is significant export potential combined with significant cultural or institutional barriers to trade. Awarding extra points to applicants from the target countries is likely to be unpopular with everyone except eligible applicants, but a workable alternative would be to have special advertising campaigns, and more immigration offices, in the targeted countries. Finally, more could be done to use immigrants' trade-related skills and contacts once they settle in New Zealand. Immigrants could be provided with the same sort of advisory services and encouragement to cultivate connections with the home country as are provided to New Zealanders overseas.

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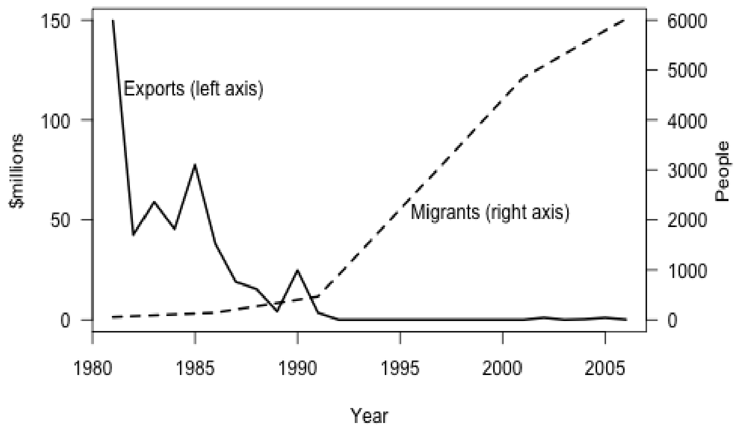
Appendix B Excluding Iraq

We excluded Iraq from our dataset after discovering that it was responsible for several large and influential outliers. Appendix Figure 1 illustrates why. After the beginning of the Iran-Iraq war in 1980, New Zealand's exports to Iraq fell sharply. They started to recover after the conclusion of hostilities in 1988, but fell again after Iraq's invasion of Kuwait in 1990 and stayed low during subsequent hostilities and trade sanctions. Imports were never more than $NZ4 million during the period 1981-2006. However, migrants from Iraq increased steadily from the mid-1980s. The substantive significance Iraq's outlier status is that the normal migration-trade relationship does not hold in the cases of prolonged hostilities and large refugee flows. Iran and a number of African countries experiencing conflicts were generated outliers, though none as large as Iraq.

Figure 2 New Zealand exports to and migrants from Iraq



Data on the diaspora

Our data on numbers of expatriate New Zealanders come from the Global Migrant Origin Database, March 2007 Update. The Global Migrant Origin Database is published by the Development Research Centre on Migration, Globalisation and Poverty at the University of Sussex (www.migrationdrc.org), and was developed in conjunction with the World Bank. The data refer to approximately the year 2000, the year of the most recent global census round. We use Version 4 of the database, which imputes values if direct estimates are not available. However, we adjust the original imputed values for New Zealand, because the standard methodology overstates the likely numbers in the New Zealand case. The original method is based on estimates of the propensity of a country to send migrants overseas. The estimated propensity is very high for New Zealand, but this is because large numbers of New Zealanders are in Australia, and does not accurately reflect the propensity of New Zealanders to travel further afield. For instance, it produces an estimate of 1,553 New Zealanders in the Democratic Republic of the Congo, compared to 1,213 Australians. We calculated an adjusted propensity for New Zealanders to migrate by excluding New Zealanders in Australia, and used this to create new imputed values. The procedure gave more reasonable numbers: for instance, it reduced the estimated number of New Zealanders in the Republic of the Congo to 486 (which is nevertheless still implausibly high). The total number of imputed New Zealanders was 34,846 under the original method and 13,552 under our method. The total number for whom no imputation was necessary was 493,751.

Appendix C Tables

Appendix Table 1 – Trade in tourism (total arrivals and departures), 1981 to 2006

Variable	Exports		Imports	
	Selection	Trade	Selection	Trade
Migrants	0.0531	0.1740**	-0.0069	0.2689**
	(0.0418)	(0.0073)	(0.0383)	(0.0086)
Diaspora	0.0083	0.1401**	0.0653**	0.1864**
	(0.0240)	(0.0051)	(0.0208)	(0.0058)
Mass	0.3286**	0.4049**	0.0984†	0.2249**
	(0.0785)	(0.0134)	(0.0590)	(0.0175)
Population	-0.3318	-0.6436**	0.4569†	-0.0626
	(0.2896)	(0.0470)	(0.2352)	(0.0506)
Distance	-2.0809**	-2.2030**	-1.9576**	-2.2292**
	(0.1578)	(0.0252)	(0.1383)	(0.0283)
Non-English	-0.3785**	-0.2212**	-0.3602**	-0.1506**
	(0.0884)	(0.0206)	(0.0787)	(0.0237)
WTO Member	0.0113	0.2238**	0.1226†	0.1586**
	(0.0967)	(0.0176)	(0.0707)	(0.0196)
Real Exchange Rate	-0.0133	0.0326**	-0.0532*	0.1214**
	(0.0249)	(0.0053)	(0.0209)	(0.0049)
Zero Migrants	-0.1844†	0.2517**	0.0384	0.3685**
	(0.1001)	(0.0543)	(0.0992)	(0.0747)
Zero Diaspora	-0.3754**	0.2299**	-0.5406**	0.5525**
	(0.0870)	(0.0331)	(0.0828)	(0.0429)
Average Migrants	0.2821**	0.1913**	0.3587**	0.1211**
	(0.0468)	(0.0093)	(0.0428)	(0.0110)
Average Mass	0.3850**	0.3958**	0.4402**	0.2034**
	(0.0868)	(0.0155)	(0.0670)	(0.0197)
Average Population	-0.0499	0.1888**	-0.7219**	-0.1391**
	(0.2905)	(0.0474)	(0.2355)	(0.0511)
Average Real Exchange Rate	0.0294	0.0093	0.0030	-0.1187**
	(0.0284)	(0.0066)	(0.0239)	(0.0067)
Log Likelihood	-1331.778	-6064.094	-1332.615	-6131.113
Observations	5025	3936	5025	3458
Countries	205	201	205	197

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. 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.

Appendix Table 2 – Merchandise trade, excluding oil, 1981 to 2006

Variable	Imports	
	Selection	Trade
Migrants	0.0248	0.2663**
	(0.0376)	(0.0746)
Diaspora	-0.0253†	0.1276**
	(0.0153)	(0.0206)
Mass	0.0819	0.7118**
	(0.0666)	(0.1179)
Population	0.6621**	0.6504
	(0.2402)	(0.4007)
Distance	-0.5870**	-1.3592**
	(0.0884)	(0.0983)
Non-English	0.2693**	-0.1265
	(0.0580)	(0.0877)
WTO Member	0.4537**	1.1504**
	(0.0709)	(0.1103)
Zero Migrants	-0.3701**	0.3830
	(0.1007)	(0.2865)
Zero Diaspora	0.0585	0.2991*
	(0.0719)	(0.1291)
Real Exchange Rate	0.0043	0.1551**
	(0.0288)	(0.0496)
Average Migrants	0.2266**	0.2726**
	(0.0405)	(0.0790)
Average Mass	0.1576*	0.3883**
	(0.0708)	(0.1220)
Average Population	-0.7469**	-1.0205*
	(0.2401)	(0.4014)
Average Real Exchange Rate	0.0097	-0.1853**
	(0.0307)	(0.0521)
Log Likelihood	-1341.668	-8836.355
Observations	5025	3602
Countries	205	199

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. Dependant variables are in 2006 New Zealand dollars. 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.

Appendix Table 3 – Allowing the effect of migration to vary by language

Variable	Exports		Imports	
	Selection	Trade	Selection	Trade
Migrants	0.7025**	0.0553†	0.1316*	0.0468
	(0.0654)	(0.0291)	(0.0557)	(0.0333)
Migrants x Non-English	-0.5816**	0.0086	-0.0100	0.1676**
	(0.0516)	(0.0187)	(0.0337)	(0.0231)
Diaspora	-0.4853**	0.0417**	0.0606	0.1755**
	(0.0556)	(0.0158)	(0.0444)	(0.0177)
Diaspora x Non-English	0.5859**	0.0303†	-0.0740	-0.0696**
	(0.0596)	(0.0177)	(0.0468)	(0.0205)
Mass	0.2872**	0.6312**	0.2098**	0.6559**
	(0.0729)	(0.0359)	(0.0631)	(0.0420)
Population	0.4419	1.1313**	1.1416**	0.2153
	(0.3370)	(0.1139)	(0.3504)	(0.1471)
Distance	-0.7953**	-2.6637**	-0.6753**	-1.8485**
	(0.1604)	(0.0513)	(0.1319)	(0.0552)
Non-English	0.7297**	-0.1989*	0.4361**	-0.3818**
	(0.1470)	(0.0820)	(0.1312)	(0.1059)
WTO Member	0.1706	0.3992**	0.1186	0.3000**
	(0.1144)	(0.0391)	(0.0882)	(0.0418)
Real Exchange Rate	-0.0859**	0.0405**	0.0003	0.0945**
	(0.0223)	(0.0104)	(0.0255)	(0.0143)
Zero Migrants	0.1944†	0.2099**	0.2121†	0.4733**
	(0.1116)	(0.0721)	(0.1265)	(0.1402)
Zero Diaspora	-0.7943**	-0.2262**	-0.2212*	0.1338†
	(0.1038)	(0.0596)	(0.0917)	(0.0728)
Average Migrants	0.2324**	0.1946**	0.4004**	0.1887**
	(0.0531)	(0.0279)	(0.0536)	(0.0299)
Average Mass	0.3000**	0.2334**	0.1244†	0.6026**
	(0.0850)	(0.0395)	(0.0719)	(0.0452)
Average Population	-0.9017**	-1.2975**	-1.2901**	-0.6501**
	(0.3358)	(0.1139)	(0.3513)	(0.1478)
Average Real Exchange Rate	0.0246	-0.1284**	0.0154	-0.1506**
	(0.0264)	(0.0132)	(0.0294)	(0.0165)
Log Likelihood	-1076.388	-9434.552	-1315.446	-8881.003
Observations	5025	4076	5025	3602
Countries	205	201	205	199

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. Dependant variables are in 2006 New Zealand dollars. 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.

Appendix Table 4 – Allowing the effect of migration to vary by income

Variable	Exports		Imports	
	Selection	Trade	Selection	Trade
Migrants	0.3862**	0.0097	-0.0329	0.1002**
	(0.0891)	(0.0305)	(0.0668)	(0.0323)
Migrants x Low Income	-0.1699*	0.0595**	0.1721**	0.1065**
	(0.0829)	(0.0193)	(0.0486)	(0.0213)
Diaspora	-0.1333†	0.0136	0.2353**	0.1948**
	(0.0698)	(0.0192)	(0.0484)	(0.0209)
Diaspora x Low Income	0.1995**	-0.0065	-0.2282**	-0.1414**
	(0.0725)	(0.0208)	(0.0520)	(0.0232)
Mass	0.2495**	0.6674**	0.2287**	0.6909**
	(0.0780)	(0.0361)	(0.0696)	(0.0423)
Population	0.7810**	1.1224**	1.1831**	0.2862*
	(0.3016)	(0.1149)	(0.3540)	(0.1454)
Distance	-0.6376**	-2.4185**	-0.7499**	-1.8739**
	(0.1543)	(0.0496)	(0.1328)	(0.0550)
Non-English	-0.4373**	-0.0208	0.1333†	0.3623**
	(0.0974)	(0.0406)	(0.0795)	(0.0466)
WTO Member	0.1910	0.4196**	0.1056	0.3112**
	(0.1176)	(0.0388)	(0.0877)	(0.0416)
Real Exchange Rate	-0.1027**	0.0393**	-0.0003	0.0934**
	(0.0214)	(0.0104)	(0.0263)	(0.0142)
Zero Migrants	0.1374	0.2275**	0.2248†	0.5165**
	(0.1047)	(0.0709)	(0.1284)	(0.1377)
Zero Diaspora	-1.2073**	-0.5268**	-0.1831*	-0.1972**
	(0.1070)	(0.0600)	(0.0913)	(0.0720)
Average Migrants	0.2052**	0.2306**	0.4094**	0.2089**
	(0.0458)	(0.0281)	(0.0548)	(0.0303)
Average Mass	0.2665**	0.2611**	0.0991	0.5152**
	(0.0874)	(0.0404)	(0.0768)	(0.0461)
Average Population	-1.1589**	-1.3867**	-1.3060**	-0.7008**
	(0.3023)	(0.1155)	(0.3546)	(0.1458)
Average Real Exchange Rate	-0.0018	-0.1258**	0.0163	-0.1539**
	(0.0254)	(0.0130)	(0.0299)	(0.0164)
Log Likelihood	-1092.200	-9430.565	-1313.456	-8880.156
Observations	5025	4076	5025	3602
Countries	205	201	205	199

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. Dependant variables are in 2006 New Zealand dollars. 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.

Appendix Table 5 – Allowing elasticity to change with the number of migrants and diaspora

Variable	Exports		Imports	
	Selection	Trade	Selection	Trade
Migrants	0.5034**	0.2490**	0.1182	0.1161**
	(0.0700)	(0.0364)	(0.0720)	(0.0375)
Square of Migrants	-0.0444**	-0.0205**	0.0008	0.0076**
	(0.0064)	(0.0030)	(0.0058)	(0.0027)
Diaspora	-0.2545**	-0.0404	-0.1647**	0.3798**
	(0.0758)	(0.0273)	(0.0629)	(0.0250)
Square of Diaspora	0.0440**	0.0054†	0.0272**	-0.0373**
	(0.0121)	(0.0031)	(0.0097)	(0.0027)
Mass	0.2872**	0.5562**	0.2080**	0.6622**
	(0.0741)	(0.0376)	(0.0627)	(0.0415)
Population	0.6796*	1.0645**	1.1446**	0.2225
	(0.3024)	(0.1304)	(0.3535)	(0.1444)
Distance	-1.1617**	-3.0458**	-0.7233**	-1.8643**
	(0.1596)	(0.0595)	(0.1354)	(0.0550)
Non-English	-0.6829**	-0.1895**	0.3194**	0.0949†
	(0.1016)	(0.0518)	(0.0802)	(0.0500)
WTO Member	0.1454	0.5045**	0.1194	0.2970**
	(0.1158)	(0.0423)	(0.0881)	(0.0413)
Real Exchange Rate	-0.0879**	0.0347**	-0.0006	0.0962**
	(0.0214)	(0.0123)	(0.0256)	(0.0144)
Zero Migrants	0.3705**	0.6330**	0.2061	0.4145**
	(0.1383)	(0.0971)	(0.1537)	(0.1486)
Zero Diaspora	-1.2067**	-0.4617**	-0.3894**	0.4931**
	(0.1246)	(0.0790)	(0.1069)	(0.0792)
Average Migrants	0.1745**	0.3018**	0.3965**	0.1966**
	(0.0485)	(0.0295)	(0.0539)	(0.0296)
Average Mass	0.3719**	0.5672**	0.1298†	0.5975**
	(0.0852)	(0.0416)	(0.0719)	(0.0450)
Average Population	-1.0862**	-1.4416**	-1.2945**	-0.6487**
	(0.3023)	(0.1309)	(0.3539)	(0.1453)
Average Real Exchange Rate	0.0564*	-0.0977**	0.0169	-0.1715**
	(0.0260)	(0.0154)	(0.0294)	(0.0166)
Log Likelihood	-1086.875	-9637.062	-1315.458	-8881.875
Observations	5025	4076	5025	3602
Countries	205	201	205	199

Notes – For definitions of the variables refer to Table 3. Year and country specific effects are included in all regressions. Dependant variables are in 2006 New Zealand dollars. 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.

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