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Econometric Analyses of Labour Market Outcome for Immigrants

An Ethnic Spatial Network Approach

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A thesis submitted in partial fulfilment of the requirements for the degree of
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Abstract

This PhD research examines the effects of “ethnic capital” on immigrants’ performance in the New Zealand labour market from three aspects: economic assimilation effect, immigrant entrepreneurship (self-employment), and location choices. This research adopts “ethnic capital” as a key concept to explain this phenomenon and to fill the literature gap. In contrast to previous international studies, the “ethnic spatial network approach” is employed to account for ethnic concentration and networks in order to capture the effects of social and resource networks for immigrant groups. This new approach makes a contribution to the international economics literature on immigrant assimilation.

This PhD thesis follows a three-essay format. The first essay is the core, focusing on the “assimilation effect” in New Zealand. Previous studies have discovered that Asian immigrants in New Zealand have substantial income disadvantages, in comparison with the New Zealand native-born residents. However, they have not provided sufficient explanations on how the ethnic factors of Asian immigrants influence their assimilation processes. Essay One examines the “assimilation effect”. By comparing immigrant ethnic groups, the analysis identifies the differences between immigrant ethnic groups with regard to the earnings dimension. The second essay is about immigrants’ self-employment in New Zealand. This essay identifies whether and how, ethnic factors help immigrants (especially Asian immigrants) to be self-employed. This analysis shows that the effect of ethnic capital on newly arrived Asian immigrants will be significantly strong. The third essay is about immigrants’ location choices. Ethnic enclaves and other ethnic factors can influence immigrants’ location choices. The effect of ethnic capital on immigrants’ location choices is expected to be significant for Asian immigrants and others whose first language is not English.

This PhD thesis confirms that the conventional approach for estimating network effects may fail to capture the real effect of immigrants’ networks and it tends to either under- or over- estimate the effect of other socio-economic variables. This study further shows that the ethnic spatial network approach offers three advantages: it captures a more accurate effect of networks; it provides a better estimation of the impact of other socio-economic variables; and it provides a better data fit.

The empirical findings of this study strongly suggest that immigrants tend to assimilate over time, but this effect is significantly affected by immigrants’ ethnic group, local concentration and resources. An ethnic network promotes self-employment among recent immigrants to New Zealand. Furthermore, a strong positive correlation is observed between immigrants’ ethnic networks and their location choices of primary ethnic enclave (especially for Asian immigrants) and resulting positive employment.

Finally, the results of this study strongly suggest the greater attention should be given to the role of ethnic capital and immigrant networks in research and policy on the economic assimilation process of immigrants.

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Disclaimer

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Chapter 1. Introduction

This PhD thesis follows a three-essay format. The first essay is the core and focuses on the immigrant economic “assimilation effect” in New Zealand. Previous studies have discovered that Asian immigrants in New Zealand have substantial income disadvantages, in comparison with native-born residents. However, they have not provided sufficient explanations on how the ethnic factors (e.g. ethnic concentration and ethnic network) of Asian immigrants influence their assimilation processes. The second essay is about immigrants’ self-employment in New Zealand, and it identifies whether, and how, ethnic factors help immigrants (especially Asian immigrants) to be self-employed. The third essay examines immigrants’ location choices. A core concept throughout the analyses is the effect of ethnic capital (networks and socio-economic resources) on immigrant labour market outcomes.

New Zealand is traditionally a country of immigrants, and the structure of its established skilled workforce is significantly affected by immigration. In addition, immigrants’ economic performance also strongly influences New Zealand’s economy, and it is therefore, of special analytical and policy interest.

During the past two decades, a series of reforms and adjustments has been made to New Zealand’s immigration policy. The policy shocks have had a significant effect on recent immigrants’ demographic composition and potential labour market performance. For example, in 1987, the preferred status of “traditional source countries” was replaced by the “stream” approach in the Immigration Act 1987. As a result, since then New Zealand has received more immigrants from regions outside of Europe, such as Asia. The

significant difference for these immigrants in the labour force is that their first language is mostly not English, and they have a different cultural background from New Zealand.

New immigrants (particularly those whose first language is not English) may face some disadvantages in finding a job in the host country's labour market (e.g. Borjas, 1992; Chiswick, 1978). Potential factors are: lack of initial English language proficiency, absence of social networks and information about job applications, and issues with transferability of skill. These disadvantages are expected to be reflected in immigrants' earnings in wage and salary jobs, self-employment and also location choices.

The economics literature on immigration has generally focused on earnings from wage and salary jobs. It has further hypothesised that immigrants would be eventually economically assimilated, because immigrants are arguably a more self-motivated group (e.g. Chiswick, 1978). However, it is also recognised that assimilation processes of different ethnic groups happen in diverse patterns and time ranges (Borjas, 1985; Poot, 1993; Poot, 1998; Stillman & Maré, 2009; Stillman & Velamuri, 2010; Winkelmann & Winkelmann, 1998). While some immigrant groups demonstrate economic convergence, other immigrant groups continue to face difficulties in the host country. As such, their economic assimilation requires longer time periods; or they may never be assimilated. Furthermore, some studies (e.g. Le, 2000) indicate that the requirements for self-employment could be much higher than finding a job in the wage/salary sector especially for immigrants.

In addition, the impact of social networks on immigrants' employment and earnings has received recent attention (e.g. Edin, Fredriksson, & Aslund, 2003; Frijters, Shields, & Price, 2005). The empirical literature on economic outcomes for immigrants generally assumes that individual decisions are independent of other immigrants.

However, individuals are mutually linked through friendship, kinship, and fellow relationships. In this context, experiences, knowledge, information and other products are produced and shared through social networks. Previous studies show that social networks may exert a significant influence on an individual's labour market performance, such as employment (e.g. Edin et al., 2003). For example, individuals may benefit from their friendships; their friends may introduce job opportunities to them or assist them with their job applications. Social networks are argued to be "the most profitable avenue of job search" for immigrants (Frijters et al., 2005). For these reasons, individuals' labour market performance may not be independent and identically distributed (*i.i.d.*), especially for immigrants. Thus, the labour market performance of an individual is geographically and ethnically correlated with that of other individuals to some extent.

In this study, I focus on the impact of ethnic capital (Borjas, 1992) in helping immigrants to overcome disadvantages to some extent. Ethnic capital is a kind of social capital and resource made up of the inherent trust and advantages within a certain ethnic group. Therefore, non-English speaking immigrants may benefit from ethnic capital and face fewer barriers in finding employment (e.g. self-employment). Also, these immigrants would like to locate in a place where it may be much easier to access this special ethnic resource for them. Ethnic capital is a special capital, generally speaking, it refers to capital and resources made up of the inherent trust and advantages for a certain ethnic group. As such, ethnic capital is expected to assist new immigrants to adjust to the new environment in the host country; enhance new immigrants' feelings of security, solidarity, and identity within the ethnic group; and generate economic resources for immigrants. Therefore, by choosing a specific location, immigrants may benefit from ethnic capital and face fewer barriers in finding a job.

This study adopts a specific econometric model – “Ethnic Spatial Network Model” (spatial model) to test the hypothesis of “Ethnic Capital” impacts on the labour market outcomes for immigrants. I extend the international literature by providing a new approach to capture the effect of ethnic-spatial networks on immigrants’ labour market performance. To the best of my knowledge, this is the first trial of adopting the “ethnic spatial network approach” in immigration studies.

Prior studies generally assume that individuals’ earnings, employment (e.g. self-employment), and location choices are independent and identically distributed (*i.i.d.*), and they adopt either ethnic concentration or language as a proxy of immigrants’ network in the host country (e.g. Bertrand et al., 2000). However, because of network effects, the labour market performance of an individual could be geographically and ethnically correlated with that of other individuals. In this manuscript, I construct an “ethnic spatial network” variable from individual level data to account for networks in order to capture the effects of social and resource networks for immigrant groups. Econometric results across panel/longitudinal data sets confirm that the conventional approach for estimating network effects may fail to capture the real effect of immigrants’ networks. I also find that conventional models tend to either under- or over-estimate the effect of other socio-economic variables when the network effect is not accounted for.

Ethnic capital provides important new enhancements for immigration studies. Hypotheses of ethnic capital addressed in this thesis have not been previously examined in relation to the questions I address, especially in the context of New Zealand. Thus, in order to understand the effects of ethnic resources and networks on recent immigrants’ labour market performance in New Zealand, the following three essays address three research questions: (1) How immigrants’ assimilation is influenced by ethnic capital? (2)

In what way does ethnic capital assist immigrants to be self-employed? and (3) How does ethnic capital affect immigrants' settlement location behaviour? Each essay focuses on one of the question above. A brief introduction for the three essays follows.

1.1. Essay One: Ethnic Capital and the Earnings of Immigrants

Essay One examines the question of immigrant economic 'assimilation' in New Zealand, by focusing on the earnings of immigrants relative to earnings of the comparable native-born population. The analysis in Essay One investigates the effects of ethnic capital (ethnic network and ethnic concentration) on immigrant economic assimilation. This essay firstly introduces the concept and hypotheses of 'ethnic capital', and then constructs the 'ethnic spatial network approach' to model immigrants' ethnic networks. This approach extends the international literature by addressing this less-investigated question. Essay One further shows that the ethnic spatial network approach offers advantages including capturing a more realistic effect of networks, when compared to the conventional model.

When it comes to measuring the economic achievements of immigrants, labour market "assimilation" is an indicator that plays a vital role in immigration research. "Assimilation" is an indicator that helps determine the earnings of an immigrant comparable to the native earning capacity to the duration of time spent in the host country. LaLonde and Topel (1991) have pointed out that when the immigrants are not assimilated adequately, it may add additional burden over the public welfare systems and aggravate

other social issues such as poverty. As a result, the economic achievements of the immigrants assume an important analytical role in policy making.

A paper on the Americanization of immigrant earnings was first published in 1978 by Chiswick. This paper is responsible for laying the theoretical foundation for assimilation studies. Through this paper, Chiswick (1978) argues that the immigrant population is initially at a vast disadvantage in the job market compared to the natives. This could be attributed to the lack of language skills, understanding of the customs, networking skills, lack of information on job opportunities, and also the necessary training required to succeed in the native job market environment. As a result of these factors, immigrants, especially those that do not speak English as a first language, may face greater challenges in finding jobs. It may also take these immigrants much longer to earn at par with the natives.

Economists are of the opinion that immigrants may eventually economic assimilate as they learn more about the host country and start adapting according to their environment. Studies have shown the influences on the process of assimilation from various factors including the place of origin (e.g. Beenstock, Paltiel & Chiswick 2010; Borjas, 1987; Chiswick & Miller, 2008), the quality of other immigrant companions (Borjas 1985), language skills (Chiswick & Miller, 1995, 1996; Dustmann & Fabbri, 2003; McManus, Gould, & Welch, 1983), and also the concentration of their ethnicity (Edin et al., 2003; Lazear, 1999).

Previous international studies have also provided evidence pointing toward the process of assimilation of immigrants across countries (Chiswick, 1978, 1980; Chiswick, Lee, & Miller, 2005; Constant & Massey, 2003; Fertig & Schurer, 2007). While some researchers provided conclusive evidence, many others have not been able to successfully

confirm the significance of the assimilation process across all immigrant groups. This can be demonstrated through Borjas' (1985) examination of cross-sectional versus cohorts analysis which pointed out that the assimilation effect was a lot weaker compared to previous studies conducted in the US. Similarly, Chiswick and Miller (2008) have observed a powerful negative assimilation effect for the male immigrant population in the US.

Studies have also been conducted that concentrate on the differences of assimilation effects for different groups of diverse ethnicity. These studies have revealed that the processes of assimilation for different ethnic groups can have different time-lines and patterns (Borjas, 1982; Chiswick, Paltiel, Beenstock, 2010). The divergent assimilation process of immigrants to the US from Cuba and Mexico was first observed by Borjas (1982). Similarly, McDonald and Worswick in 1999 documented the differences in the earnings power of non-English speaking immigrants and the native-born population in Australia. Another study by Chiswick et al., (2010) points at how the Asian and African immigrants face greater challenges when immigrating to Israel, compared to those from the former USSR.

Data collected from the New Zealand census in 2006 shows that over 22% of the resident population in New Zealand consisted of foreign-born people. The Asian workforce made up for over 8% of the total labour force present in New Zealand and it is the third largest group in the labour force in New Zealand. The Asian population in New Zealand doubled between the years 2001 and 2006. Moreover, China occupied the second place as the source of immigrants in New Zealand according to the census of 2006. This has changed the language composition of New Zealand (e.g. as many as 2% of the total population of New Zealand speak Chinese).

Over the past two decades, New Zealand immigration policy has undergone a series of adjustments and reforms. Prior to 1987, the Occupational Priority List distinguished immigrants through occupation and appraised skill shortages. Skilled immigrants were chosen from preferred source countries such as parts of Europe, and in particular the UK and the Netherlands. After 1987, the preferred status of the source countries was replaced by a stream approach of the Immigration Act of 1987. The Immigration Act of 1987 also made certain adjustments to the Occupational Priority List and it added more amendments. These reforms led to immigrants from Asia and other non-English speaking parts of the world to be accepted into New Zealand.

The immigration policy of New Zealand witnessed further reforms post 1991 and completely transformed the immigration system in New Zealand leading to a revolution in the immigrant selection strategy. Notably, a “points system” replaced the Occupational Priority List through the Amendment Act of 1991. This points system granted the applicants points on the basis of their personal characteristics and skill. The system was preferential towards those with a high score. This system was replaced in 2003 by the Skilled Migrant Category policy, which is somewhat similar to the old system. The new policy includes the points system, but it also paid special attention to the applicants’ labour characteristics. The points system focuses on factors, such as the proficiency of the individual in the English language, qualifications and experience of the applicant, and also the existence of a job offer. These changes in the immigration policy had a deep impact on the performance of the immigrants in the labour market, and also their composition demographically. Stillman and Maré (2009) observed that 60% of the permanent residency approvals arise from skilled and business categories. They have also observed the change in skill quality across various groups of immigrants from the income surveys.

Studies related to New Zealand have confirmed differences in labour market outcome by ethnicity. Winkelmann and Winkelmann (1998) suggested that immigrants to New Zealand from Australia and the UK could earn a greater income compared to the natives. However, the immigrants from Asia fail to demonstrate the same level of economic achievement. Asian immigrants faced disadvantages particularly in the earlier stages. Stillman and Maré (2009) employed 1997-2007 New Zealand Income Survey data and confirmed that the incomes of Asians as well as Pacific Islanders are significantly lower, compared to the natives of New Zealand. Stillman and Velamuri (2010) suggested that workers from the UK earned more on average compared to natives of New Zealand with similar skill sets, while Asian workers with similar skill sets earned less than the natives.

The findings of previous international and New Zealand studies have led to the rise of several research questions on why there are differences in economic achievements across different immigrant groups, and how ethnicity impacts immigrant performance in the labour market.

The concept of ethnic capital focuses on the premise that individuals belonging to an ethnic group in a locality can influence each other and as a result, their performance in the labour market. Studies conducted have not yet shown conclusive results to determine how ethnic factors (e.g. ethnic networks) influence economic assimilation process and performance of immigrants in the labour market. Likewise, most literature available on networks usually points at linguistic concentration (Bertrand, et al., 2000) or ethnic concentration (Andersson & Hammarstedt, 2011; Edin et al., 2003) as a factor that determines the network of immigrants within the labour markets.

In addition, previous empirical studies on the earnings of immigrants generally assume that the performance of an individual in the labour market is distributed identically and independently. This study hypothesises that the performance of an individual in the labour market may be dependent of other immigrants present in the labour market. This research, therefore, relaxes the assumption of *i.i.d.* of individual observations by introducing the spatial model of assimilation, to account for immigrant networks. This approach allows researchers to construct a representation of the immigrant's network of social and economic resources, by using the data available at individual level based on three different conditions. The conditions are: (1) the ethnic group, (2) the residential region and (3) the year when survey was conducted. As a result, this approach allows a better understanding of the effect of immigrant networks based on the data. In this context, the spatial approach is applied to estimate the effect of the ethnic network on the assimilation of immigrants.

This study also adopts the Generalized Method of Moments (GMM) estimation method. This method corrects for heteroscedasticity and accounts for the potential endogeneity in the immigrant networks. The regression results confirm that the spatial approach offers three unique advantages: (1) The quality and strength of association of immigrant networks can be estimated; (2) The spatial approach provides a better fit to the data compared to the conventional approach; and (3) A better estimation can be made of the impact of personal characteristics and human capital variables by using the spatial model.

The empirical findings of this research suggest that recent immigrants may face disadvantages in the New Zealand labour market. However, immigrants share social and economic resources within the ethnic networks in New Zealand. Ethnic capital plays an

important role in the assimilation process of immigrants as ethnic capital (e.g. ethnic network¹ and ethnic concentration²) could help immigrants to overcome disadvantages to a certain extent. For example, by choosing certain locations, immigrants may benefit from their ethnic capital and thereby, face fewer obstacles in procuring employment. Hence the ethnic spatial network approach adopted in this dissertation represents the process more accurately.

Furthermore, in order to examine the effectiveness of the ethnic spatial network model and the hypothesis of ethnic capital, I use an eight-year Australian panel data set (HILDA) to provide a sensitivity test of the model with an alternative data set. Regression results confirm that controlling for ethnic capital enhances the analytical explanation of the assimilation model across both data sets, thus the spatial model is preferred in modelling immigrant assimilation. Empirical evidence further shows that immigrants tend to assimilate over time, but this effect is significantly affected by immigrant's ethnic spatial network effects and resources.

¹ Ethnic network refers to the economic resources of network belong to a specific group of immigrants.

² Ethnic concentration has been defined in various forms across studies. For example, Borjas (1986) argued that a Hispanic enclave definitely helped the Hispanic immigrant entrepreneurs in the United States due to the cultural and language similarities for three Hispanic groups (Mexicans, Cubans, and other Hispanics). He defined the ethnic concentration variable as the proportion of Hispanic population of the MSA's2 population in the United States.

1.2. Essay Two: Ethnic Capital and Immigrant Entrepreneurship

This essay aims at examining the immigrant choices that include self-employment as opposed to seeking employment in the wage and salary sector. The analysis in Essay Two makes use of personal characteristics that include skill, experience, resources, and assets of immigrants in New Zealand. This essay also investigates how ethnic capital can help immigrants achieve self-employment. This question extends the international literature by addressing this less-investigated question.

New Zealand includes a significant population of immigrants that is self-employed. According to the 2013 Census about 18.8% of the total employed population was self-employed of which 6.6% employer and 12.1% self-employed. Over 22% of the self-employed residents in New Zealand are immigrants.

It can be recalled that the New Zealand immigration policy has received several reforms and adjustments in the past two decades. As a result, the probability of immigrants being accepted from Asia and other non-English speaking regions has increased. In particular, there has been a significant increase in the number of Asian immigrant communities in New Zealand, assuming an important role in the New Zealand economy. Economists have hypothesised that immigrant-owned businesses are more effective when it comes to serving immigrants from the same ethnic group. As a result, there is a great demand for self-employment compared to finding a job in the immigrant sector.

Asian immigrants may face more challenges when setting up a business in New Zealand compared to immigrants from the UK and Ireland who are from a similar English language background. However, within the ethnic networks, immigrants may find assistance in establishing their own businesses. This is in particular expected to be

helpful for those immigrants with initial poor language proficiency and lower education skills. In addition, immigrant businesses are attractive to immigrants for employment and products, and as a result immigrant enclaves may grow and amplify the ethnic capital effect.

This essay makes use of the ethnic spatial network model to study the effects of social and economic networks on self-employment choices of immigrants. This method is compared to the conventional ‘ethnic concentration’ variable. The ethnic spatial network approach used in this study provides a better approximation of the impact of social and economic variables, and it also provides a better fit to the data. This essay uses the recent longitudinal LisNZ data set which has three waves (around 2006 to 2009).

Econometric results confirm that the conventional approach for estimating network effect may fail to capture the real effect of immigrants’ networks. These results further confirm that conventional models tend to either under- or over-estimate the effect of other socio-economic variables when the network effect is absent. The results further show that, by adopting the spatially autoregressive network approach to construct immigrants’ ethnic networks, the effectiveness of self-employment models can be enhanced.

The empirical findings of this essay strongly support the hypothesis that ethnic networks may promote self-employment by immigrants to New Zealand.

1.3. Essay Three: Ethnic Capital and the Location Choice

Essay Three focuses on recent immigrants' location choices in New Zealand. Because immigrants' location choices correlate to job opportunities, immigrant settlement choices are important outcomes. By choosing a specific location, immigrants may benefit from ethnic capital and face fewer barriers in finding a job. Differently from the conventional approach, this essay provides tests of the ethnic spatial network model. In addition, this essay provides the first trial to identify the 'primary ethnic enclave' for different immigrant groups to examine immigrants' labour market integration in New Zealand.

New immigrants in the host country may be sensitive to the regional and cultural differences compared to the immigrants that may have been well settled. As seen earlier, Chiswick (1978) has hypothesised that immigrants who do not speak English as a first language may face a significant amount of disadvantage when finding jobs in an English speaking country. However, immigrants can seek help from established ethnic enclaves and networks with similar ethnic background in certain regions of the host country. As a result, it is hypothesised that ethnic capital (e.g. ethnic network, primary ethnic enclaves³) can help immigrants overcome disadvantages to a certain extent. Therefore, immigrants may locate in a place that makes it favourable for them to access their ethnic capital.

This makes certain locations more attractive to immigrants. The quality and the size of this ethnic capital can vary depending on the location. Immigrants may attempt to establish themselves in those regions where they can access their ethnic networks and resources. Immigrants whose first language is not English can, for example, benefit from this ethnic capital and find employment without facing many hurdles. Immigrants with

³ In general, it means high level of ethnic concentration. More details are provided in section 4.3.2 "Primary Ethnic Enclave (High Level of Ethnic Concentration)".

poor language proficiency and low skill usually depend more greatly on ethnic capital for jobs. Therefore, they are more likely to locate in a neighbourhood with a large ethnic enclave (i.e. their primary ethnic enclave(s)).

The approach that has been adopted in this essay provides a new method compared to earlier studies of the location choice. Earlier approaches included linguistic concentration or ethnic concentration as an intermediary for the ethnic networks. This essay adopts the spatial approach that, as noted, helps better account for the effects of socio-economic resources of ethnic networks. This approach allows for the construction of a representation of an individual immigrant's socio-economic network from individual-level data, and accounts for the relationship between immigrants' location choices and those of their relevant ethnic group.

In Essay Three I identify a primary ethnic enclave for immigrants in New Zealand on the basis of calculations made, using the residential concentration quotient by ethnic group. To construct the ethnic network for immigrants and to study the influence of the ethnic networks on location choices, a spatial model is adopted. To track the dynamics involved behind immigrant decision-making choices, certain adjustments are made. Immigrant personal characteristics along with the characteristics of the locations are frequently considered in all analysis of the location choices to model the settlement locations accurately. Testing alternative hypotheses based on ethnic capital shows how ethnicity can influence the location choices of immigrants in New Zealand.

Essay Three employs the Longitudinal Immigrant Survey: New Zealand data and identifies the key factors that play a role in immigrant decision-making during the initial stages of settlement in New Zealand.

The approach used for modelling the location choices of immigrants is by adopting the panel logit model. This approach is used in related empirical studies and the same approach is used in this study.

Estimation results (odds ratios and average marginal effects) confirm that the models that do not have a provision for ethnic networks may over or under estimate the effects of conventionally used social and economic variables.

The empirical evidence points out that primary ethnic enclaves influence the immigrant labour markets in New Zealand to a great extent. Primary ethnic enclaves also generate more social and economic resources for recent immigrants in employment. Recent immigrants from non-English-speaking countries and a different cultural background from that of New Zealand rely more heavily on their primary ethnic enclaves. Essay Three shows that both low skilled and highly skilled immigrants depend on primary ethnic enclaves for social and economic resources, but the effect is greater in the case of low-skilled immigrants.

Results across the three essays show strong evidence on the effect of ethnic networks on enhancing immigrant economic outcome.

1.4. Structure of this Thesis

The plan of this thesis is as follows: Chapters 2 to 4 present the three essays. Each essay includes the relevant review of the literature and analyses. Chapter 5 provides a brief summary, followed by conclusion in Chapter 6.

Chapter 2.

Essay One: Ethnic Capital and the Earnings of Immigrants

2.1. Introduction

“Assimilation” is an important indicator which measures the economic performance of immigrants with increasing years of residence since settlement process. The word “assimilation” refers to the processes along which an immigrant’s economic performance converge to a comparable native level, after residing in the host country for a certain period of time. As LaLonde and Topel (1991) pointed out, if new immigrants are not successfully assimilated, “increased immigrant flows may place additional burdens on public welfare systems, while exacerbating other social problems associated with persistent poverty”. Therefore, the economic performance of immigrants is of special analytical and policy interest.

In 1978, Chiswick published his paper on the effect of Americanisation on the earnings of foreign-born men. This paper laid a systematic theoretical foundation in the area of economic assimilation studies. Chiswick (1978) argued that in contrast with natives, immigrants are disadvantaged in the host country’s labour market as they lack English language skills, social networks, knowledge of customs, information about job opportunities, and firm-specific training. Due to these factors, new immigrants (especially those whose first language is not English) may face higher barriers in finding a job. In addition, it might take a long time for their income to converge to the income level of natives in the host country.

However, a number of economic studies also hypothesise that immigrants will be assimilated eventually since immigrants continue to learn about the host country (Chiswick, 1978). Subsequent studies also observed significant influences on the assimilation process for immigrants from other factors: the quality of immigrant cohorts (Borjas, 1985), country of origin (e.g. Beenstock, et al., 2010; Borjas, 1987; Chiswick & Miller, 2008), ethnic concentration (e.g. Edin et al., 2003; Lazear, 1999) and English language ability (e.g. Chiswick & Miller, 1995, 1996; Dustmann & Fabbri, 2003; McManus, Gould, & Welch, 1983).

A number of international studies have shown evidence of the assimilation process on immigrants around the world (e.g. Chiswick, 1978, 1980; Chiswick, et al., 2005; Constant & Massey, 2003; Fertig & Schurer, 2007). At the same time, other researchers could not confirm that the assimilation process was significant and successful for all immigrant groups. For example, by testing synthetic cross-sectional data, Borjas (1985, 1995) found the assimilation effect was much weaker than was reported in previous cross-sectional studies in the US. Likewise, by examining the 1980, 1990 and 2000 US Census, Chiswick and Miller (2008) observed a strong “negative” assimilation effect on foreign-born men in the US.

An increasing number of studies have paid attention to the differences in assimilation effects across ethnic groups. It is also recognised that the assimilation processes of different ethnic groups have diverse patterns and time ranges. Borjas (1982) observed divergent assimilation processes for immigrants from Cuba, and Mexico to the US. McDonald and Worswick (1999) have documented the persistence of income disparities between immigrants (from a non-English speaking background) and natives in Australia. Beenstock, et al., (2010) have found immigrants from Asia and Africa to Israel

faced much greater earning disadvantages than those who migrated from the former USSR. At the same time, European immigrants had higher incomes than natives in Israel.

These findings give rise to questions as to why there are differences of economic performance across ethnic groups and how ethnicity influences immigrants' labour market performance. One may consider whether individuals within ethnic groups influence each other and their labour market performance is therefore correlated to some extent. Likewise, prior economic studies have provided little empirical evidence as to how ethnic factors influence immigrants' assimilation process and labour market performance. In this essay, I use ethnic capital as a key concept. The literature on networks generally adopts either ethnic concentration/enclave (Andersson & Hammarstedt, 2011; Edin et al., 2003), or linguistic concentration (Bertrand, et al., 2000) as the proxy for the immigrants' network in the host country's labour market. In addition, prior empirical studies of immigrant earnings or employment have assumed that the labour market performance of an individual is independent and identically distributed (*i.i.d.*).

It is noteworthy that an ethnic enclave is a specific location in the host country. For example, it provides special socio-economic resources and advantages to immigrants. These reasons include "networks" and a "protected market" for ethnic entrepreneurs. Therefore, if one argues that an ethnic concentration/enclave is the proxy of an ethnic network for immigrants, then the effect of networks may be mixed with other effects of ethnic enclaves relating to socio-economic variables.

Instead, in this study, I hypothesise that the labour market performance of individuals may not be independent of other immigrants – independent and identically distributed (*i.i.d.*) – to their location choices. I adopt the "ethnic-spatial autoregressive

network” to account for networks in order to capture the effects of social and economic resource networks for immigrant groups. By doing so, I am able to construct a representation of the individual's network of socio-economic resources from individual-level data, and observe the correlation of immigrants’ location choices. Throughout this approach, I relax this assumption by introducing a spatial autoregressive model of immigrants’ assimilation, and I examine the effect of controlling for ethnic network effect, based on this new approach, on results. The spatial approach is applied to estimate the network effect on immigrants’ assimilation.

This approach allows an individual’s earnings to be geographically and ethnically correlated with that of other individuals. I adopt the “spatial model” of network effects and Generalized Method of Moment (GMM) estimation approach to estimate the effects of ethnic capital and human capital on the relative earnings of immigrants. Regression results confirm that the adopted ethnic spatial network approach offers three advantages: (1) it allows one to estimate the effect of the quality or the degree of association of immigrants’ network; (2) compared to the conventional approach (adopting ethnic concentration as the proxy of network), the spatial approach provides a better data fit; (3) the spatial model also provides a better estimation of the impact of personal characteristics and human capital variables.

The following discussion briefly introduces New Zealand's immigration policy and its current situation.

2.1.1 Background

Data from the 2006 New Zealand Census (Statistics New Zealand, 2006a), shows that approximately 22.9% of the population usually resident in New Zealand was foreign born. In addition, the Asian workforce made up around 8.3% of New Zealand's total labour force, which is the third largest source of labour for New Zealand. During the period 2001 to 2006, the Asian population in New Zealand almost doubled. In addition, following the UK, China had become the second largest source of immigrants for New Zealand in 2006. The rapid increase of immigrants who come from non-English speaking countries has changed the language composition of New Zealand. For example, about 2% of the New Zealand population spoke Chinese in 2006. Furthermore, 80.3% of usual residents who could not speak English were immigrants. Table 1 below shows the employed population of New Zealand by ethnic group and the significance of the Asian population.

Table 1: Total Employed and in the Labour Force Population by Ethnic Group, Census 2006

Ethnic Group	Total Employed				Total Labour Force				Total People Stated
	European	Maori	Pacific Peoples	Asian	European	Maori	Pacific Peoples	Asian	
Auckland Region	379341	55305	63186	103668	394269	61938	70815	113418	660440
Total NZ Regional Councils	1366914	225360	96087	158067	1423356	253233	107613	1956960	2076609

Source: Statistics New Zealand (2006b)

Generally, Auckland region is the largest ethnic enclave in New Zealand. About 37% of its residents came from overseas. The Auckland region also attracts most of the

Pacific Islands' workforce (and makes up 65.8% of the total Pacific Island's workforce) and most of the Asian workforce (and makes up 65.65% of the total Asian workforce). Furthermore, there were 103,668 Asian employed workers (around 65.58% of Asian employed workers in New Zealand) employed in the Auckland region.

During the past two decades, a series of reforms and adjustments has been made to New Zealand's immigration policy. Before 1987, the "Occupational Priority List" (OPL) distinguished preferred immigrants via occupations with appraised skill shortages (Winkelmann & Winkelmann, 1998). Skilled immigrants were principally selected from "traditional source countries" such as the UK, other European countries and North America. In 1987, the preferred status of "traditional source countries" was replaced by the stream approach of the Immigration Act 1987. The Immigration Act 1987 distinguished three streams of prospective immigrants: (1) skill and business stream; (2) family stream; and (3) humanitarian stream. At the same time, the Immigration Act 1987 also made corresponding adjustments to the OPL systems and rationalised them. These reforms raised, to some extent, the probability of prospective immigrants from Asia and other non-English speaking regions being accepted.

The series of reforms after 1991 completely changed New Zealand's immigration system and caused a radical revolution in selection strategy. Notably, instead of OPL, the points system came into force through the Immigration Amendment Act 1991. The new points system grants applicants points based on their personal characteristics. The points system preferred applicants with high scores. In 2003, it was supplanted by the "Skilled Migrant Category" policy; similar to the old system, the new policy still adopted the points approach but also paid attention to a partner's labour characteristics. The points system emphasises the importance of factors such as English language ability, job offer, applicants' qualifications and experience (Department of Labour, Stillman & Maré, 2009). In

2007, the points schedule was modified in order to select more immigrants for New Zealand industries that face skill shortages, and for future growth areas. In addition, the new policy also granted points for applicants' educational attainments, especially those obtained in New Zealand.

The changes in immigration policy created profound effects on immigrants' labour market performance, as well as New Zealand's demographic composition. Stillman and Maré (2009) found that, New Zealand receives about 50,000 permanent residents per annum, around 60% of residence approvals are from the skilled and business category. They observed the skill quality changes across different cohorts of immigrants through data from the New Zealand Income Survey (NZIS). Recently arrived immigrants (that is, immigrants who arrived in New Zealand between 1998 and 2007) are more likely to be employed. Stillman and Maré claimed this is due to immigration policy settings, as applicants who have a job offer are preferred. Moreover, their results suggested that immigrants who arrived in New Zealand after 1987 (when the limitations of the "traditional source" preference were abolished) have higher wages in contrast with earlier cohorts due to higher average skill levels.

2.1.2 Economic Issues

Many studies show evidence of immigrants' assimilation processes around the world (Chiswick, 1978, 1980; Chiswick et al., 2005; Constant & Massey, 2003; Fertig & Schurer, 2007). Other economists argue that assimilation processes are insignificant. For example, by testing synthetic cross-sectional data, Borjas (1985, 1995) found that the assimilation effect in the US was much weaker than previous cross-sectional studies

claimed. McDonald and Worswick (1999) could not find a significant assimilation process on immigrants in Australia by using a standard fixed-effects specification.

More and more studies have paid attention to the differences of assimilation effect across ethnic groups. It is also recognised that the assimilation processes of different ethnic groups happen in diverse patterns and time ranges. Borjas (1982) observed different assimilation processes for immigrants to the US from Cuba, and Mexico. Kossodiji (1988) claimed that the effect of English proficiency was greater for Hispanic immigrants than for Asian immigrants in the US. McDonald and Worswick (1999) observed the persistence of income disparities between immigrants (from a non-English speaking background) and natives based on the Australian Income Distribution Survey data. Beenstock, et al., (2010) found immigrants from Asia and Africa faced much greater earning disadvantages in Israel than those who were from the former USSR, while at the same time, West-European immigrants had higher incomes than natives.

Many studies related to New Zealand also confirmed ethnicity differences. Winkelmann and Winkelmann (1998) used the 1981, 1986 and 1996 New Zealand population censuses and found immigrants who came from the UK and Australia could earn a salary as high as those of natives. Moreover, Asian immigrants may face some disadvantages at the beginning, but their earnings may catch up with those of natives in a short time. However, in contrast, Pacific Island immigrants fail to experience the same positive results as Asian immigrants. Stillman and Maré (2009), based on the New Zealand Income Survey data, confirmed their finding that Asian and Pacific Islanders' incomes are significantly lower than the income of New Zealand natives, while immigrants from the UK enjoy higher incomes than local people. Stillman and Velamuri (2010) noted that only workers born in the UK earn more, on average, than similarly

skilled New Zealand-born workers; however, other workers from Asian countries earn significantly less.

In summary, while some immigrant groups demonstrate economic convergence, other immigrant groups continue to face difficulties in the host country, and therefore their economic assimilation either requires longer time periods, or they would never be economically assimilated. Prior economic studies have provided few theoretical explanations for this phenomenon. In particular, the role of social network is worthy of further attention. This essay uses ethnic capital as a key concept to explain this effect, and contributes to this literature gap in assimilation studies.

2.1.3 Structure of Essay One

Essay One is arranged as follows. After this introduction, two research approaches are discussed in a literature review section. Section 2.3 provides a full description of ethnic capital and of certain hypotheses based on that concept. Section 2.4 discusses the models and econometric method adopted in this study. Section 2.5 describes the data sets used in this analysis. Empirical results and discussions are provided in Section 2.6. The last section summarises this chapter.

2.2. Literature Review

Different approaches are involved in testing the immigrant assimilation hypothesis (IAH) (e.g. cross-sectional, and longitudinal). Most previous studies adopted the cross-sectional approach, which observes a significant assimilation effect and suggests immigrants' income grows rapidly in the initial stage and then at a decreasing rate. Longitudinal studies did not obtain a similar conclusion. Different approaches have their own features in testing IAH. This section firstly summarises current economic theories on assimilation; then it provides a brief summary and comparison of different modelling approaches for testing IAH.

2.2.1 Summaries of Economic Theories on Assimilation

Chiswick (1978) argued that in contrast with natives, immigrants are disadvantaged in the host country's labour market as they lack local language skills, social networks, knowledge of customs, information about job opportunities, and knowledge about local employers. In addition, issues with transferability of skill also disadvantage immigrants in the host country's labour market. Due to these disadvantages, new immigrants (especially those whose first language is different from the host country) may face greater barriers to their success in job applications, and it may take a long time for their income to converge to the comparable level of natives in the host country.

However, economists have hypothesised that immigrants will be assimilated eventually, since immigrants are arguably more self-motivated than the average person among natives and they are willing to work longer. For example, Adsera and Chiswick (2007) studied the earnings of immigrants in 15 European countries and found that

immigrants' earnings will catch up with natives after 18 years of migration. Subsequent studies have shown that the assimilation effect may depend on factors such as self-selection, ethnic concentration, country of origin, cohort effects, education, years since migration, age, and skill effect.

Education is an important factor associated with differences in labour market outcomes, and the profile of convergence may vary according to different education levels (Winkelmann, 2000). Education is a signal of an immigrant worker's skill and ability which assists highly educated immigrants to gain a better job or occupation at the initial stage and in the following stages. Therefore education confers higher earnings growth on them (Yamauchi, 2004). Similarly to education, "years since migration" is another important indicator of human capital accumulation for immigrants in the host country. Many international studies include this variable as a key variable and a principle reference for the velocity of assimilation (for example Aguiar & Gusafsson, 1991; Beenstock et al., 2010; Borjas, 1989; Chiswick, 1978; Chiswick & Miller, 2008; McDonald & Worswick, 1999).

Transferability of skill is another factor; many studies show that skills cannot be transferred among countries perfectly, as different countries have different systems of issuing degrees or certificates of authentication. For example, skills obtained in less-developed countries may be less useful to employers in a more developed host country (Duleep & Dowhan, 2002). In addition, Chiswick, Lee and Miller (2005) indicated a vital role host country qualifications play in the immigrant assimilation process, such that a local qualification in the host country raises earning growth. It is considered that local qualifications could surmount the difficulties of transferability of skills for immigrants (Parasnis, et al., 2008).

Borjas (1985) pointed out that the quality of immigrants across different cohorts is not homogeneous; therefore, immigrants' assimilation effect would be overestimated if the cohort effect was not controlled for. Examining US census data, Borjas (1985, 1995) found a decline in immigrant quality. Nevertheless, different countries face different conditions and the cohort effect may vary. After assessing the 21 waves of the German Socio-economic panel from 1984 to 2004, Fertig and Schurer (2007) concluded that it takes less than nine years for recent cohort immigrants to earn a similar level of income to comparable German natives, a duration which is shorter than findings in earlier cohort studies.

The effects of country of origin may strongly affect assimilation. To some extent, country of origin is a key determinant of the entry-earning differences among immigrants. Borjas (1987) pointed to four determinants of entry earnings for immigrants. Three of these relate to the country of origin: native language, political system and the level of economic development of the source country. Entry earnings for immigrants are expected to be high in the case of a source country that has stable political status, a high level of economic development and the same language as the destination country. Winkelmann and Winkelmann (1998) also confirmed that immigrants from some high-income countries have outcomes similar to native-born individuals, while other immigrants fail to demonstrate signs of relative improvement in labour market outcomes over time.

Other considerations are that ethnic concentration affects assimilation effects positively. In fact, the positive and negative effects of ethnic concentration may be more significant for some groups of immigrants than for others. For example, some positive effect has been found in European countries (e.g. Edin et al., 2003). However, a negative

effect has been found in the US (Lazear, 1999). The effect of ethnic concentration on most recent immigrants' economic assimilation in New Zealand remains unknown; thus this study aims to examine the effect of ethnic concentration by using the newest New Zealand data to investigate how ethnic concentration, resources and networks influence the assimilation effect in New Zealand.

2.2.2 Cross-sectional Studies

Among earliest studies, Chiswick (1978) employed a cross-sectional model in his pioneering work and successfully traced the assimilation process on the foreign-born white man in the US using 1970 Census data. The econometric model he used is:

$$\ln Y_i = \ln Y_0 + \gamma S_i + C_1 T_i + C_2 T_i^2 + C_3 (YSM_i) + C_4 (YSM_i^2) + u_i \quad (1)$$

where Y_i is earnings for individual "i"; " S_i " denotes years of schooling, which can be divided into years of schooling before and after immigration; T_i is years of labour market experience, which is equal to the sum of experience before and after immigration; " YSM " stands for years since migration, thus its coefficient suggests the effect of duration in the host country on immigrants' earnings; lastly, u_i is an error term.

The empirical results show initial wage disadvantages for immigrants and a faster rate of wage increase than the equivalent rate for natives with more years of residence in the host country. The finding confirmed Chiswick's hypothesis that immigrants face many barriers in the host country's labour market in the initial stage; however, immigrants are more self-motivated and the effect of return to human capital for them is greater, which leads to faster growth in wages. When the dichotomous variables

of country of origin are added, this model allows us to observe the differences of effect across ethnic groups.

Chiswick (1980) and Borjas (1985) raised serious doubt on the accuracy of findings from prior cross-sectional studies, and pointed out that they may be biased upward due to several issues such as re-migration of immigrants and changes in the quality of immigrants' cohorts. In order to control for the skill quality changes of immigrants, Borjas (1985, 1995) established an econometric framework for examining IAH by cross-sectional data, which is known as "Synthetic Cohort Methodology" (SCM) or "Synthetic Cohorts". The SCM combines sequential cross-sectional data sets but it does not guarantee that the same immigrants can be traced over time. Borjas (1995) applied the following models using 1970, 1980 and 1990 Public Use Samples of the US Census:

$$\ln w_{ij} = X_j \phi_i + \delta_i A_j + \alpha y_j + \sum_t \beta_t C_t + \gamma_i^0 \pi_j^0 + \gamma_i^1 \pi_j^1 + \varepsilon_{ij} \quad (2)$$

$$\ln w_{nj} = X_j \phi_n + \delta_n A_j + \gamma_n^0 \pi_j^0 + \gamma_n^1 \pi_j^1 + \varepsilon_{nj} \quad (3)$$

where "i" denotes immigrant and "n" denotes native; so w_{ij} stands for the wages of immigrant "j" and w_{nj} stands for the wages of native "j" and; "X" is a vector of socio-economic characteristics; "A" is the individual's age as at the time of the census; "y" is the years since migration; "C" is a vector of dummy variables which indicates the cohort that immigrant "j" belongs to; π_j^0 is a dummy variable which indicates the 1970 Census; π_j^1 is a dummy variable which indicates the 1980 Census. In addition, the data, which includes both natives' and immigrants' information, is pooled in order to identify the parameters of this model. Unlike the previous findings from the cross-sectional model,

Borjas (1985, 1995) discovered a decline in quality of immigrants and weak assimilation process in the US.

In recent assimilation research in New Zealand, Stillman and Maré (2009) examined the pooled cross-sectional data from the 1997 to 2007 New Zealand Income Survey in order to examine how outcomes of employment, occupation and wages changed for immigrants with years spent in New Zealand. They employed the following model and controlled for the cohort effect:

$$Y_{it} = \beta Imm_{it} + f(YrsNZ_{it}) + \delta X_{it} + \alpha_t + e_{it} \quad (4)$$

where “ i ” is the index for individual, “ t ” is the index for time; “ Imm ” is a dummy variable which indicates whether the individual is an immigrant or not; “ $YrsNZ$ ” represents the years in New Zealand; “ X ” is a vector of other controlled socio-economic variables; the term α_t are time-fixed effects which controls macroeconomic conditions; e_{it} is the error term.

From this model, some of the findings from Winkelmann and Winkelmann (1998) are confirmed, such as a result that immigrants from Asia and the Pacific Islands face an initial income disadvantage; but for Pacific Islanders, the situation does not improve as much. Asian immigrants also face entry disadvantages; however, the returns to local human capital for Asian immigrants are significant. Immigrants usually start with a lower occupational rank than the comparable New Zealand natives (when controlling for education, age, and cohort). However, after about 15 years, occupational assimilation is expected to have occurred. Stillman and Maré also concluded that immigrants with university qualifications have a much steeper income to year-since-migration profile; the time it takes to converge to the comparable native’s earning level is around ten years.

2.2.3 Longitudinal Studies

Several studies have adopted the longitudinal approach to test the IAH and found weaker assimilation on immigrants in most cases. Chiswick (1980) questioned the potential longitudinal effect bias of the cross-sectional estimates and examined immigrant adult males' earnings using the National Longitudinal Survey of Adult Males data, which did not suggest significant bias.

Borjas (1989) provided a longitudinal study based on the 1972-1978 Survey of Natural and Social Scientists and Engineers. He employed the following models:

$$\ln W_{ij}(t) = X_{ij}(t)\theta_i + \alpha_1 y_j(t) + \alpha_2 y_j^2(t) + \beta_1 C_j + \beta_2 C_j^2 + \gamma_i t + \varepsilon_{ij}(t) \quad (5)$$

$$\ln W_{nl}(t) = X_{nl}(t)\theta_n + \gamma_n t + \varepsilon_{nl}(t) \quad (6)$$

where $W_{ij}(t)$ represents the earnings of immigrant “ j ” at time “ t ” ($t=0, 1$); X_{ij} is a vector of socio-economic characteristics (includes individual's age); y_j stands for the years since migration; C_j is a vector of dummy variables which indicate the cohort for immigrant “ j ”; and ε_{ij} is the error term.

Immigrants' earnings are estimated by equation (5), and natives' earnings are estimated by equation (6). Borjas (1989) argued that the structural parameters (age, cohort and period effect) in these two equations indicate important factors which influence immigrants' assimilation process. In addition, coefficients β_1 and β_2 suggest the cohort effect; γ_i and γ_n measure the period effect which is caused by the macroeconomic conditions. Furthermore, he noticed that the period effects for immigrants and natives may be different as one may be more sensitive than its counterpart. As a result, Borjas estimated immigrants' and natives' earnings individually using these two equations.

It is noteworthy that in all of these studies, the earnings of immigrants are assumed to be *i.i.d.* The empirical evidence suggests that the assimilation effect on immigrants was relatively small. Recent immigrant scientists and engineers received parity wages with the comparable natives and overtaking is not expected to happen during their working lives. Moreover, there was a drop in both the quality and skills of immigrant scientist and engineering cohorts during 1970 to 1990.

A recent study in Australia by Chiswick, et al. (2005) examined the IAH based on the Longitudinal Survey of Immigrants to Australia (Panel I). They claimed that the longitudinal model best fitted to analysing wage growth is Nakamura and Nakamura's (1985) inertia model. This model considers earnings at the last interview in relation to the earnings, hours worked, and immigrants' personal characteristics in the first interview. Thus, in summary the model is:

$$\ln Y_{t,i} = \beta_0 + \beta_1 \ln Y_{1,i} + \beta_2 \ln H_{1,i} + \beta_3 X_{t,i} + \beta_4 \ln H_{t,i} + \varepsilon_i \quad (7)$$

where $\ln Y_{t,i}$ refers to the natural logarithm of weekly earnings of individual "i" reported in wave t (last wave); $\ln H_{1,i}$ indicates the natural logarithm of hours of work in wave t ; $X_{t,i}$ is a vector of socioeconomic variables (which specifically includes educational attainment and VISA category in this case); ε_i is the random disturbance term.

Equation (7) can be expanded to include the variables which have principal influences on an individual's wage growth. Therefore, Chiswick, et al. (2005) finally adopted the following model:

$$\ln Y_{3,i} = \beta_0 + \beta_1 \ln Y_{1,i} + \beta_2 \ln H_{1,i} + \beta_3 X_{3,i} + \beta_4 \ln H_{3,i} + \beta_5 \Delta ALME_{3-1,i} + \varepsilon_i \quad (8)$$

$\Delta ALME_{3-1,i}$ denotes the amount of labour market experience acquired between the time of the wave-one interview and wave-three interview.

Finally, they found “considerable immigrant adjustment”, that is, immigrants’ real weekly earnings were found to have increased by about 25% over three years. In addition, the empirical evidence suggests a negative relationship between initial weekly earnings and the rate of earnings increase. That is, immigrants who are low-paid at first are more likely to experience a much faster growth in earnings. It also confirmed that immigrants with human capital investments that are better related to the host country can expect a much higher income. In addition, immigrants who came from an English-speaking country and on a skilled visa category generally enjoyed high earnings. The empirical evidence from this research also confirmed findings from other Australian assimilation studies which adopted the cross-sectional approach (e.g. Chiswick & Miller, 2005).

Other studies also employed longitudinal models. Duleep and Regets (1997) employed matched samples from the Current Population Survey, and without using cross-sectional estimates they still observed a significant assimilation effect on immigrants. Moreover, when controlling for geography and employing the same geographic distribution for immigrants and natives, the immigrants’ earnings growth was significantly slower. Beenstock, et al. (2010) investigated matched samples of adult male immigrants from the 1983 and 1995 Israeli Census data; they could not find a strong assimilation effect in Israel.

2.2.4 Cross-sectional vs. Longitudinal

Most cross-sectional estimates suggest a significant effect of duration (years since migration) on immigrants' earnings growth. However, re-migration may not occur randomly and the quality of immigrants may differ by cohorts over time; therefore, it has been argued that cross-sectional estimation may be upward biased (e.g. Borjas, 1989; Chiswick et al., 2005).

Moreover, Borjas (1989) indicated that the structural parameters of cross-sectional models are not identified. As mentioned previously the estimation of earnings for an immigrant is:

$$\ln W_{ij}(t) = X_{ij}(t)\theta_i + \alpha_1 y_j(t) + \alpha_2 y_j^2(t) + \beta_1 C_j + \beta_2 C_j^2 + \gamma_i t + \varepsilon_{ij}(t) \quad (9)$$

Because calendar year (T) in the cross-sectional data set can be observed for every immigrant, one can suppose $T = C_j + y_j$ and then we can re-write equation (9) as:

$$\ln W_{ij}(t) = (\beta_1 T + \beta_2 T^2 + \gamma_i) + X_{ij}\theta_j + (\alpha_1 - \beta_1 - 2\beta_2 T)y_j + (\alpha_2 + \beta_2)y_j^2 \quad (10)$$

The constant term and coefficient of duration (year since migration) are the functions of T; consequently, structural parameters are not identified and mix up the assimilation effect with period effect and cohort effect.

Therefore, some economists have made certain improvements. In order to control for the cohort effect, Borjas (1985) developed the "Synthetic Cohort Methodology" (SCM), which constructs "synthetic panel data" by a succession of cross-sectional data. Although this model does not compare the same group of immigrants over

time, it efficiently controls for the cohort effect and sheds light on assimilation analysis. However, the issue of emigration (for example, re-migration) is still not solved by the SCM due to the limitations of cross-sectional data.

Longitudinal estimation seems to give the “best” estimates of the assimilation process (Chiswick et al., 2005), but there are still some problems associated with it. Beenstock, Chiswick and Paltiel (2010) concluded there were four difficulties with longitudinal data: (1) compared with cross-sectional data sets, the sample size of longitudinal data sets is relatively small; (2) the time range of longitudinal data is relatively shorter; (3) most longitudinal data followed immigrants only, not natives, so comparisons are unfeasible; and (4) collecting longitudinal data is costly and sample attrition is a major issue. In addition, longitudinal data on immigrants and their earnings are rare (Chiswick, Lee, & Miller, 2002).

Another consideration with longitudinal and synthetic panel study is the potential limitation known as “period effect” (Beenstock et al., 2010). Period effect (price changes) allows the shape and slope of the assimilation profile to change over time. As Beenstock, et al. said “in longitudinal data the increase in earnings of long-duration immigrants (a small increase but a large stock of destination human capital) can be greater than the relative increase for recent immigrants (a relatively large increase in destination human capital on a very small base)”. A rejection of IAH may be caused by a compounding of price and quantity (human capital) effects. However, this problem can be avoided in cross-sectional studies as there are no price effects in cross-sectional data. Longitudinal data without any period effects can also efficiently measure immigrants’ assimilation processes.

2.2.5 Relationship to Previous Studies

Immigrant's labour market outcomes play a vital role in their socio-economic integration in New Zealand. Previous New Zealand studies (e.g. Maré & Stillman, 2010; Poot, 1993; Stillman & Maré, 2009; Winkelmann & Winkelmann, 1998; Winkelmann, 2000) have analysed human capital and how personal characteristics affect immigrants' assimilation processes. However, the effect of ethnic capital (e.g. ethnic network and ethnic concentration) on immigrants' economic performance in New Zealand remains unknown.

The relationship between the effect of ethnic networks and the effect of ethnic concentration on immigrants' economic assimilation is also not clear from previous studies. Because an ethnic enclave (high level of ethnic concentration) is a specific location in the host country, it provides special advantages to immigrants such as a lower level of local language skills required for employment. The network is spatially defined as the level of ethnic concentration and the quality of network is differ across different localities. Therefore, if one argues that ethnic concentration is the proxy of an ethnic network for immigrants, then the effect of ethnic networks may be mixed with the other effects of ethnic enclaves relating to socio-economic variables. Different from previous studies, specific hypotheses have been made for ethnic network and ethnic concentration separately in this study. Furthermore, by adopting ethnic concentration as the proxy for immigrants' network, the joint effect of the size and the quality of immigrants' networks will be estimated but not the pure effect of the quality of their network.

2.2.6 Ethnic Spatial Network Approach

To provide a remedy, the ethnic spatial network approach adopted in this study addresses the weaknesses of the earlier approach. I hypothesise that the labour market performance of individuals may not be independent of other immigrants – independent and identically distributed (*i.i.d.*). One of the contributions of this study is that the immigrants’ ethnic network has been constructed by the spatial model. The “spatial lag” in the spatial model shows the correlation of immigrants’ labour market performance and is not concerned with the other effects of ethnic enclaves. Therefore, this study is designed to fill the identified literature gap. The ethnic spatial network approach and its ethnic spatial lag adopted in this study will be discussed in Section 2.4.

2.3. Theoretical Framework of Ethnic Capital

Immigrants experience different assimilation processes across ethnic groups. In this section, I discuss the concept of ethnic capital in its broader sense adopted here, and consider relevant hypotheses based on ethnic capital.

2.3.1 Ethnic Capital

As discussed in Section 2.1.2, previous studies observed evidence of different performances in relation to immigrant assimilation processes across ethnic groups (e.g. Borjas, 1987; Chiswick, 1978; Stewart & Hyclak, 1984; Stillman & Maré, 2009; L. Winkelmann & Winkelmann, 1998). In addition, immigrants experience different returns

on human capital (such as the return on education) across ethnic groups (see McDonald & Worswick, 1999), native languages (Kossoudji, 1988) and English ability (Chiswick & Miller, 2008). These phenomena have been observed; however, they have rarely been fully interpreted within ethnic analyses.

Borjas (1987) rooted the reasons for different assimilation profiles across ethnic groups in the effect of country of origin. As noted earlier he considered four factors which influence immigrants' performance in the host country's labour market: age composition of immigrants, native language, political system, and economic development of the source country.

Indeed, Borjas' theory successfully explains the factors that stem from the country of origin. These factors are a type of "innate" capital (and resources) for immigrants that are given by their source country. Furthermore, this kind of capital is unlikely to be influenced by individual immigrant choice, since it is dependent on the overall macro-environment and culture of the country of origin. As a result, under the umbrella of social capital, ethnic capital is special and it may only belong to members of the same ethnic group and cannot be utilised by others.

However, "innate" capital for immigrants is not only from the country of origin. Immigrants can access such capital in the host country as well, because earlier immigrants have already built up an ethnic environment (especially social and commercial networks and other relative economic factors). Therefore, this is a resource as well as a capital accessible to subsequent immigrants from the same ethnic group. Such a resource generated from the ethnic environment in the host country is considered to have a more profound effect on immigrants' assimilation than the resources from their source country, since they are created by previous immigrants in the host country and influenced by local

socio-economic factors. In addition, this resource comes from immigrants themselves, so it can be adjusted and affected by immigrants collectively. This implies that the “innate” capital from the host country may vary over time, which is different from the nature of the “innate” capital from the country of origin⁴.

The concept of ethnic capital was first put forward by Borjas (1992). He claimed that ethnicity plays a key role in the human capital accumulation process. Borjas (1992), in particular, studied the effect of ethnic capital on the next generation immigrants’ skills. The empirical evidence suggests that the skills of the immigrants’ next generation significantly depend on both parental inputs and the quality of the ethnic environment (which Borjas calls “ethnic capital”).

The present study enhances the definition of ethnic capital, extending the concept to include the group resources and networks of immigrants from related countries of origin, average skill level, language proficiency, social network, geographical concentration, shared beliefs and other resources for a typical ethnic group. In other words, ethnic capital is the inherent trust and advantages which stem from, and belong to, a certain ethnic group. This is a new arena for immigration studies, particularly in the context of Australia and New Zealand, where a comprehensive study on this topic is yet to emerge. This study is designed to enhance knowledge in this regard and therefore to fill the literature gap accordingly.

2.3.2 Hypotheses

After early immigrants establish social and economic networks, new immigrants benefit from them. Generally speaking, ethnic capital helps new immigrants to settle

⁴ The “innate” capital is generated from immigrants’ source country which is different from ethnic capital.

down and find employment in the host country. But the effects of ethnic capital on the process of immigrants' assimilation are different in relation to their skills, English proficiency, cohort and other demographic and economic factors. These effects include social and economic networks, markets, and information.

Network effect

Human beings are mutually linked under some conditions. These conditions include friendship, kinship, fellow relationships, as well as race relations and other relationships. We are living in an environment where experiences, knowledge, information and other products are produced and shared with each other through these kinds of networks. Previous studies show that social networks may exert a considerable influence on an individual's labour market performance (e.g. Frijters et al., 2005). For example, individuals may benefit from their friendships; their friends may introduce job opportunities to them or assist them with their job application. Social networks are argued to be "the most profitable avenue of job search" for immigrants (Frijters et al., 2005). Compared to natives, immigrants may be more dependent on their social networks in order to be economically assimilated, because they usually have less knowledge of the host country's labour market.

For these reasons, individuals' labour market performance may not be independent and identically distributed (*i.i.d.*), especially for immigrants; thus, their labour market performance is to some extent correlated with each other. For these reasons, social networks may act positively on the process of immigrants' assimilation. Previous models which analyse individual income and immigrants' assimilation effects have neglected the network effect.

Ethnic concentration

Recent international studies have generally indicated a negative effect of ethnic concentration on immigrants' earnings. For example, Chiswick and Miller (2002b), and Bertrand et al. (2000) showed that linguistic concentration negatively influenced immigrants' labour market performance in the US. In contrast, Edin et al. (2003) claimed that by correcting for the endogeneity of ethnic concentration, immigrants' earnings in Sweden were positively correlated with the size of ethnic concentration in some cases.

Therefore, ethnic concentration can affect immigrants' earnings through different channels. Firstly, immigrants may find greater employment opportunities through geographic concentration. An ethnic enclave creates job opportunities for immigrants by lowering the requirements for employment (e.g. work experience in the local language, or a locally recognised qualification). In addition, immigrant-owned businesses are considered to be the main source of employment opportunities for immigrants who come from the same ethnic group. It is observed that even after being located in the US for six years, there were still around 40% of Cuban immigrants who were working for Cuban-owned businesses (Portes, 1987). Secondly, the immigrant market is potentially important for local mainstream companies, as native-born employees might know little about immigrants' culture and language. Therefore, mainstream companies may like to hire immigrants to serve the target immigrant market. As such, an ethnic enclave might increase the employment possibilities for immigrants in and out of that ethnic enclave. Therefore, immigrants may benefit from ethnic concentration, as more jobs could be generated by ethnic and geographic concentration.

However, by lowering barriers to employment for immigrants, an ethnic enclave reduces the bargaining power of low-skilled immigrants and it may result in lower wages,

since it makes employment within the ethnic enclave relatively attractive (e.g. working in an ethnic enclave can reduce the cost of learning English) (e.g. Battu, Seaman, and Zenou, 2011)).

As a result, the effects of ethnic concentration on immigrants' assimilation might be different; for example, by ethnic group or skill level. In addition, with ethnic concentration, immigrants can be either "complements" or "substitutes" to each other. When the "substitution effect" is stronger than the "complement effect", immigrants compete for scarce employment opportunities in the host country labour market. Thus, under this kind of competition, immigrants may accept a lower salary than they would prefer in order to secure the employment opportunity. In the opposite case, if the "complement effect" dominates the "substitution effect" and with an increasing proportion of immigrants in a specific region; a higher demand for immigrant labour would be generated, leading to more job opportunities and a higher salary for immigrants.

Therefore, whether or not ethnic concentration positively impacts immigrants is an empirical question that is not yet resolved.

Different ethnic groups

It is hypothesised that ethnic capital works differently across ethnic groups. Firstly, ethnic concentration, network, average skill level, and proficiency in English vary across ethnic groups in the host country. Secondly, self-employment is another key factor to determine the size of the effect of ethnic capital, since it influences the business network for that ethnic group. Some immigrants may enjoy benefits from a high propensity for self-employment of the ethnic group which they belong to. For example, when they are starting their own business or looking for a new job, it is supposed ethnic

capital is available to help them. Finally, since these socio-economic factors are different across ethnic groups the magnitude of the effect of ethnic capital is expected to be different across ethnic groups. I test these hypotheses in this study.

2.4. Models and Estimation Method

Since, under the assumption of ethnic capital, individuals' incomes are not independent and identically distributed (*i.i.d.*), the spatial approach will be adopted in this research which relaxes this assumption. In this section, previous models which show the process of immigrants' assimilation will be shown first. The new model with spatial approach, which can investigate the network effect, is then introduced.

2.4.1 Previous Models

The conventional cross-sectional model that is used to analyse how immigrant earnings respond to the assimilation process is:

$$\ln W_i = \beta_1 X_i + \gamma t_i I_i + \beta_2 I_i + \varepsilon_i \quad (11)$$

where W_i denotes the earnings of individual i in the host country; X is a vector of explanatory variables (for example, years of schooling completed, marital status, and years of labour market experience); t denotes years since migration to the host country; I is a dummy variable set to 1 if person i is foreign-born (otherwise it is 0); ε measures how earnings grow with the assimilation process (Borjas, 1985).

Previous studies have attempted to reveal the effects of ethnic capital. When seeking the effect of proficiency in English on immigrants' earnings, Dávila and Mora (2000) formed an earning function for immigrants:

$$\ln Y_i = \alpha P_i + \beta V_i + e_i \quad (12)$$

where P is a vector of English-skill categories, V indicates a host of attributes commonly associated with earnings (such as education, experience and its square, gender, ethnicity, region etc.), α and β represent coefficient vectors to be estimated, and e is the stochastic error term. An Ordinary Least-Squares (OLS) regression of equation (2) provides insight into the relative earnings penalties associated with different degrees of English fluency, as reflected in the estimated coefficients of α .

Logan, et al. (2003) provided a model which can show the effects of self-employment and own ethnic enclave on immigrants' income:

$$\ln Y_i = \gamma X_i + \sum \alpha O_i + \sum \tau Edu_i + \sum \omega COH_i + S_i + \beta_1 EC_i + \beta_2 S_i EC_i + e_i \quad (13)$$

where X_i is a vector of an individual's characteristic variables including English skill, marriage status, presence of children, yearly worked hours; O_i is a vector of the occupation dummies; Edu_i denotes education dummy variables; S_i denotes whether that immigrant is self-employed or not; EC_i is a dummy variable which shows whether the immigrant is living in an ethnic enclave or not, and COH_i is a vector of time of arrival dummy variables. $S_i EC_i$ is the interaction term between the two dummy variables S_i and EC_i .

As noted earlier, the conventional modelling approach assumes that labour market choices and outcomes for immigrants are independent and identically distributed, I incorporate a modelling approach that relaxes this strong assumption.

2.4.2 Ethnic Spatial Network Approach

Previous international studies adopt either ethnic concentration or language as a proxy of immigrants' network in the host country (e.g. Chiswick & Miller, 1996). Unlike these studies, I adopt the "ethnic spatial network approach" to account for ethnic concentration and networks in order to capture the effects of social and resource networks for immigrant groups. I incorporate different measures of ethnic capital, in particular, ethnic group economic resources and spatial-ethnic concentration.

Furthermore, previous studies claimed that individuals are more likely to be connected to others who have similar age, ethnicity, culture, religion, educational attainment, income and behaviour (Horvath, 2011; McPherson, et al., 2001). In this study, I have constructed ethnic networks for immigrants according to the ethnicity and location.

The spatial model has often been used in studies of housing location choice; choice of transport mode, and choice of automobile (e.g., Adjemian, et al., 2010). In this study, the "Spatial-Lag Matrix" is constructed with micro data, which is based on the three conditions of: 1) ethnic group, 2) region of residence, and 3) year of survey. Therefore, I am keen to better understand the migrants' network effect through the data. The ethnic spatial network model provides more realistic theoretical and empirical framework, to investigate the effect of ethnic capital. Under the ethnic capital hypothesis, individuals' incomes depend on ethnic capital and other socio-economic variables of their

group. In this situation, one can define individuals who are from the same ethnic group and location as the first-order “ethnic neighbours”. Thus, “ethnic-spatial dependence” represents the case that an individual’s labour market performance is influenced by ethnic neighbours’ labour market performance and other ethnic capital factors in that location. Ethnic neighbour in this context refers to the residents in the same locality from the same country of origin groups.

Ethnic-spatial weight matrix

W is a $n \times n$ ethnic spatial weight matrix which shows the first-order ethnic and geographical (ethnic-spatial) relationship among individuals. Before the discussion of W , the first-order ethnic-spatial neighbourhood matrix E will be introduced. Suppose individual P1, P2, P4 and P6 are all from Asia; P1 and P4 are located in region A, while P2 and P6 are located in region B. P3, P5 and P7 are from Europe, and all of them are located in region B. Thus, the 7×7 first-order ethnic-spatial neighbourhood matrix E is:

$$E = \begin{pmatrix} & P1 & P2 & P3 & P4 & P5 & P6 & P7 \\ P1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ P2 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ P3 & 0 & 0 & 0 & 0 & 1 & 0 & 1 \\ P4 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ P5 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ P6 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ P7 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \end{pmatrix} \tag{14}$$

When the elements of the matrix E are zeros, individuals are not deemed to be first-order ethnic-spatial neighbours. In addition, the diagonal elements of the above matrix are zeros, which means individuals are not considered as neighbours to themselves.

In order to define an “ethnic-spatial lag”, the ethnic-spatial matrix E should be normalised by unifying the row sums, and so I can form the ethnic-spatial weight matrix W :

$$W = \begin{pmatrix} P1 & P2 & P3 & P4 & P5 & P6 & P7 \\ P1 & 0 & 0 & 0 & \mathbf{1} & 0 & 0 & 0 \\ P2 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ P3 & 0 & 0 & 0 & 0 & \mathbf{1/2} & 0 & \mathbf{1/2} \\ P4 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ P5 & 0 & 0 & \mathbf{1/2} & 0 & 0 & 0 & \mathbf{1/2} \\ P6 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ P7 & 0 & 0 & \mathbf{1/2} & 0 & \mathbf{1/2} & 0 & 0 \end{pmatrix} \quad (15)$$

Ethnic spatial autoregressive process

The data generating process for the situation when the value of one observation i depends on the value of its neighbour j 's observation (James LeSage & Pace, 2009):

$$y_i = \alpha_i y_j + \beta X_i + \varepsilon_i \quad (16)$$

$$y_j = \alpha_j y_i + \beta X_j + \varepsilon_j \quad (17)$$

$$\varepsilon_i \sim N(0, \sigma^2)$$

$$\varepsilon_j \sim N(0, \sigma^2)$$

Thus, equations (16) and (17) imply a “simultaneous data-generating process” that show the dependence of y_i and y_j and vice versa. This feature leads us to a data-generating process which is an “ethnic-spatial autoregressive process” and I can have the following expression:

$$y_i = \rho \sum_{j=1}^n W_{ij} y_j + \varepsilon_i \quad (18)$$

$$\varepsilon_i \sim N(0, \sigma^2) \quad i = 1, \dots, n$$

where y_i is the variable of interest (hourly earning in this case), X_i is a vector of socio-economic variables for individual i . Since the “ethnic neighbour” is defined as individuals who are from the same ethnic group and settled in the same location; thus, $\sum_{j=1}^n W_{ij}y_j$ is the “ethnic-spatial lag” in this setting and represents the linear combination of individual i 's ethnic neighbours' labour market performances.

As a result, the matrix version of equation (18) is:

$$y = \rho W y + \varepsilon \tag{19}$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

where $N(0, \sigma^2 I_n)$ represents the zero mean disturbances process with the constant variance σ^2 . I_n is the n-dimensional identity matrix.

Effect of network

Now, one can work out the model to investigate the effect of the network based on equation (19):

$$y = \alpha l_n + \rho W y + \beta X + \varepsilon \tag{20}$$

where y is hourly earnings, X is a vector of socio-economic variables; $W y$ is the ethnic-spatial lag vector which indicate the first-order ethnic-spatial relationship among individuals; l_n is a vector of ones and is associated with the parameter α . Thus, the coefficient ρ indicates the strength of the effect of the network in a specific region.

In addition, from rearranging equation (20) we can have:

$$(I_n - \rho W)y = \alpha l_n + \beta X + \varepsilon$$

$$y = \alpha(I_n - \rho W)^{-1}l_n + \beta(I_n - \rho W)^{-1}X + (I_n - \rho W)^{-1}\varepsilon \quad (21)$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

Since, the conventional economic model for immigrants' earning is:

$$y = \alpha^* l_n + \beta^* X + \varepsilon^* \quad (22)$$

Thus, in comparison, the estimated network effect in our spatial setting (equation 21), the “joint” coefficient β for variables $((I_n - \rho W)^{-1}X)$ in equation (21) where we have the “ethnic-spatial lag” included in our regression is different from the conventional coefficient for human capital β^* (in equation (22)). In other words, without considering one of the effects of ethnic capital (the network effect), one may either under-estimate or over-estimate the effects of immigrants' personal characteristics and other socio-economic factors where the case if the network effect is present. LeSage and Pace (2009) indicated that the OLS is not efficient in estimating model (20) and the coefficients are biased and inconsistent. In the section on “Estimation Issues”, an alternative estimation method – Generalized Method of Moments (GMM) Estimation will be discussed, and incorporated in our analysis.

Furthermore, since $(I_n - \rho W)^{-1} = I_n + \rho W + \rho^2 W^2 + \rho^3 W^3 + \dots$; so equation (21) can be extended into:

$$y = (I_n + \rho W + \rho^2 W^2 + \rho^3 W^3 + \dots)\alpha l_n + (I_n + \rho W + \rho^2 W^2 + \rho^3 W^3 + \dots)\beta X + (I_n + \rho W + \rho^2 W^2 + \rho^3 W^3 + \dots)\varepsilon \quad (23)$$

W denotes the first-order ethnic-spatial relationship among individuals, and ρ shows the correlation with that individual's first-order ethnic-spatial neighbours. W^2 represents the second-order ethnic-spatial relationship; ρ^2 denotes the influence from that individual's second-order ethnic-spatial neighbours (that is neighbours' neighbours). Following the same logic; $(I_n - \rho W)^{-1}$ constructs a full social network (refer to Bonacich, 1972; Katz, 1953) for that individual and it captures all the information for that network.

Effect of other ethnic-capital factors

Immigrants' labour market performance is influenced by many ethnic-capital factors, such as ethnic entrepreneurship, average language proficiency level, and ethnic concentration. In addition, the effects of ethnic-capital factors differ across different regions under the hypotheses of ethnic capital. Thus, another ethnic-spatial matrix M is needed when modelling the effects of other ethnic-capital effects. This $m \times n$ matrix denotes the first-order relationship between an individual (person) and sub-ethnic groups; where m denotes the number of individuals in the data and n represents the number of sub-ethnic groups (when combining the ethnic group and locations together). For example, individuals P1, P3, and P4 are Chinese, and while, P1 is located in region 1, P3 and P4 are located in region 2; P2 and P5 are Europeans, and P2 is located in region 1, while P5 is located in region 2. Based on this example, the ethnicity matrix M is:

$$M = \begin{pmatrix} & \begin{matrix} \text{Chinese} & \text{Chinese} & \text{European} & \text{European} \\ \text{Reg 1} & \text{Reg2} & \text{Reg1} & \text{Reg2} \end{matrix} \\ \begin{matrix} P1 \\ P2 \\ P3 \\ P4 \\ P5 \end{matrix} & \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \end{pmatrix} \quad (24)$$

Therefore, the following model will explore effects of other ethnic-capital factors.

$$y = \alpha l_n + \rho W y + X \beta + \gamma M e t h + \varepsilon \quad (25)$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

where M is the ethnicity matrix, and $e t h$ is a vector of other ethnic capital variables such as ethnic entrepreneurship, average ethnic group language proficiency level, and ethnic concentration. The parameter vector γ will reveal the effect of those factors.

Estimation issues

LeSage and Kelley (2010) discussed the biases of Ordinary Least-Squares (OLS) estimation on the parameter ρ in the Spatial-Autoregressive (SAR) model. They discussed this issue in detail:

Based on equation 20, we can set the SAR model discussed in the last section in the form of a matrix:

$$y = (W y X) \begin{pmatrix} \rho \\ \beta \end{pmatrix} + \varepsilon \quad (26)$$

Therefore, I can express the estimated OLS value of ρ and β in terms of:

$$\begin{pmatrix} \hat{\rho} \\ \hat{\beta} \end{pmatrix} = \left[\begin{pmatrix} y^T W^T \\ x^T \end{pmatrix} (W y X) \right]^{-1} \begin{pmatrix} y^T W^T \\ x^T \end{pmatrix} y = \left[\begin{pmatrix} y W^T W y & y^T W^T X \\ X^T W y & X^T X \end{pmatrix} \right]^{-1} \begin{pmatrix} y^T W^T y \\ x^T y \end{pmatrix} \quad (27)$$

As LeSage and Kelley (2010) claimed unless the assumption of zero correlation between Wy and X is met, the estimated parameter ρ under this assumption is biased and inconsistent.

$$\begin{aligned}
 \hat{\rho} &= (y^T W^T W y)^{-1} y^T W^T y \\
 &= (y^T W^T W y)^{-1} y^T W^T (\rho W y + X \beta + \varepsilon) \\
 &= \rho + (y^T W^T W y)^{-1} y^T W^T X \beta + (y^T W^T W y)^{-1} y^T W^T \varepsilon \\
 &= \rho + (y^T W^T W y)^{-1} y^T W^T \varepsilon
 \end{aligned} \tag{28}$$

Because of $y^T W^T X = 0$ since the equation (28) follows zero variance; therefore $\hat{\rho} = \rho + (y^T W^T W y)^{-1} y^T W^T \varepsilon$ under the OLS estimation and $\hat{\rho}$ is correlated with the error term.

The Maximum Likelihood (ML) estimation provides an efficient approach to estimating the parameter of spatial lag ρ , but it is very computationally complex (refer to Anselin, 1988). Anselin (1990), Kelejian and Prucha (1998), and Kelejian and Robinson (1993) proposed a Spatial Two-Stage Least Squares (2SLS) approach to control for the endogeneity of spatial lag and estimate the parameter of spatial lag ρ . As Kelejian and Robinson (1993) illustrated that with exogenous variable X , the spatial lag WX and higher spatial lags (e.g. W^2X , W^3X , ..., W^nX) work jointly as a set of instruments for the endogenous spatial lag Wy .

Notably, based on 2SLS estimation, Lee's (2007) contribution showed that "GMM estimator (GMME) may be asymptotically more efficient than the two-stage least squares (2SLS) estimator (2SLSE) and may be asymptotically efficient as the ML estimator (MLE)." In addition, he indicated that: "The GMM estimation for those models can be computationally simpler than the maximum likelihood (ML) or quasi maximum

likelihood (QML) methods in a general setting.” Also, GMM estimator can correct for heteroscedasticity.⁵ Therefore, in this study, according to the computational complexity of using the full set of instruments⁶ for the endogenous spatial lag, I have selected the first-order spatial lag of all exogenous variables X and WX as the set of instruments to explain the spatial lag Wy as suggested by Anselin (1999).

2.5. Data

In this essay, a ten-year (2001-2010) New Zealand Income Survey (NZIS) data has been examined alongside the 1996 and 2001 New Zealand Censuses. NZIS provides comprehensive labour model cross-section data across annual survey points. This section provides short summaries for NZIS and the census; and sample descriptions for both.

2.5.1 New Zealand Income Survey (NZIS)

NZIS provides specific information about an individual’s earnings, which is relevant in examining the immigrants’ assimilation hypothesis. As Statistics New Zealand (2009) has described, information about an individual’s earnings allows researchers to find out the linkages between “educational attainments, labour force status and individual or household income at both aggregate level and sub-populations of interest” (Statistics New Zealand, 2009). The first NZIS was conducted in June 1997 as a supplement to the Household Labour Force Survey June quarter (April to June), and it has

⁵ The results of Breusch-Pagan / Cook-Weisberg test for heteroscedasticity could not reject the null hypothesis in their studies.

⁶ The full set of instruments for endogenous spatial lag is: $H = [X, WX, W^2X, W^3X, \dots, W^nX]$

been conducted annually since then. The first release of NZIS was on 11 December 1997. NZIS contains respondents' income information on self-employment, wages and salaries, government transfers, other transfers (for example, private superannuation or pension schemes, and annuities) and investments (from 2002).

In this study, a merged cross-sectional data set created from 2001 to 2010 NZIS data sets was produced for and adopted in this study. For the purposes of comparability in examining immigrants' labour market performance in New Zealand, only observations for full-time employed male immigrants and natives aged between 20⁷ and 55 years old have been used in the analyses. The final merged data set contains 54,422 observations. Of these, 42,259 individuals are New Zealand born, and the remaining 12,163 are immigrants.

There are two ways to classify an individual's ethnicity: (1) by their country of origin, and (2) by their parents' country of origin. The first method is more focussed on an individual's place of birth; the second method emphasises their kinship. The NZIS reports information about the individual's country of birth and the published 1996 and 2001 New Zealand Census data report the same information. Therefore, in order to incorporate the census data with the NZIS data for location choice and ethnic spatial group characteristics, the ethnicity of an individual is classified by the country of birth of that individual.

According to the hypotheses of ethnic capital, immigrants with different cultural and ethnic backgrounds may experience different assimilation processes. Thus, it is better to group immigrants exactly by their country of origin in order to capture a more precise assimilation profile. Due to the classification of country of origin in NZIS and to

⁷ This setting allows us to have more observations. In addition, we have selected individuals who are full time employed; therefore, students will not be included in our sample.

the research design which is based on considerations of geography and language, immigrants are grouped into five ethnicities. In particular, comparing the differences of assimilation processes between the UK (which is the traditional source country) and Asian immigrants (“new” immigrants) poses an interesting and relevant comparison in this case. Therefore, Asian and UK immigrants are classified as two single groups, and the analysis focuses on these two groups⁸.

Other variables

The model also incorporates variables relating to human capital. NZIS reports the individual’s age as well as their educational attainment, and therefore, potential labour market experience can be derived from these two variables. This variable is treated as exogenous in the literature (Gladden & Taber, 2002; Schultz, 1997) and I follow this approach.

NZIS also reports the actual hourly wage from the main job and this variable is incorporated in the analyses in Essay One. The hourly wage is considered across international studies as a reliable indicator of an individual’s labour market outcome (e.g. Borjas, 1985). The hourly wage is adjusted by the New Zealand CPI across the ten years of data used in our analysis.

⁸ Australian and Pacific Islander immigrants are tagged as an individual group as well in this study.

Table 2: Variable List and Definitions for Essay One

Hourly Wage	Real actual hourly earnings from the main job (in 2006 New Zealand dollar)
Human Capital	
Experience	This is a derived variable which is equal to an individual's current age minus the age of graduation.
High School	Binary variable, equal to one if that individual's highest education attainment is High School Qualification.
Vocational Qualification	Binary variable, equal to one if that individual's highest education attainment is Vocational Qualification.
University Degree	Binary variable, equal to one if that individual's highest education attainment is University Degree.
Other Post School Qualification	Binary variable, equal to one if that individual's highest education attainment is Other Post School Qualification.
Personal Characteristics	
Years Since Migration (YSM)	This variable represents the duration of immigration.
Married	Binary variable, equal to one if that individual is married.
Arrived 2003-1010	Binary variable, equal to one if that immigrant arrived between 2003 and 2010.
Arrived 1992-2003	Binary variable, equal to one if that immigrant arrived between 1991 and 2000.
Asia	Binary variable, equal to one if that immigrant was from Asia.
Australia	Binary variable, equal to one if that immigrant was from Australia.
UK	Binary variable, equal to one if that immigrant was from United Kingdom.
Pacific Islands	Binary variable, equal to one if that immigrant was from Pacific Islands.
Rest of World	Binary variable, equal to one if that immigrant was from the rest of world.
Ethnic Capital	
Network Effect	$W\gamma$, ethnic spatial lag.
Ethnic Concentration	The lag of the proportion of the population of a specific ethnic group to the total population size in a specific region. This is assumed to be exogenous in this case.

2.5.2 1996 and 2001 New Zealand Census

The New Zealand Census supplements the NZIS data in the analysis to provide information on ethnic group characteristics by locality.

One of the ethnic-capital variables (ethnic concentration) that is derived from the published 1996 and 2001 New Zealand Census tables is ethnic concentration as explained below. This ethnic capital variable, which is measured at the New Zealand regional council level (is also consistent with the location information reported by NZIS). Ethnic concentration is used in previous studies. I use this comparison to the spatial variable derived in the previous section.

Ethnic concentration is defined in this study as

$$eth_{ij} = \frac{Population_{ij}}{Population_j} \quad (29)$$

where “*i*” denotes ethnic group, and “*j*” represents a specific region in New Zealand. The numbers of people who usually reside in a locality are reported by gender and country of origin in both the 1996 and 2001 published census tables.

I have analysed the New Zealand case in this study where there are totally 16 regions⁹. The majority of American studies (e.g. Yuengert, 1995, Borjas, 1986) have examined immigrants' geographical decisions in light of Metropolitan Statistical Areas (MSA). I would argue that New Zealand's ‘regions’, as generally organized around a major city, are quite equivalent, in terms of size.

⁹ New Zealand regions are: (1) Northland Region, (2) Auckland Region, (3) Waikato Region, (4) Bay of Plenty Region, (5) Gisborne Region, (6) Hawke's Bay Region, (7) Taranaki Region, (8) Manawatu-Wanganui Region, (9) Wellington Region, (10) Tasman Region, (11) Nelson Region, (12) Marlborough Region, (13) West Coast Region, (14) Canterbury Region, (15) Otago Region, and (16) Southland Region.

2.5.3 Demographic Characteristics

Due to adjustments to New Zealand immigration policy during the past two decades, the structure of the immigrant population in New Zealand has been profoundly changed in many aspects, such as country of origin, language skill, and education level. In this section, immigrants are considered by their ethnic groups. This information shows the differences in the characteristics of immigrants from different ethnic backgrounds.

Table 3: Descriptive Statistics for Males in New Zealand, Age 20-55, NZIS (2001-2010)

	NZ-Born	Foreign-Born	Australia	UK	Asia	Pacific	Rest of World
Age (Mean)	36.74	37.35	39.05	39.63	34.81	36.22	37.14
High School Qualification (%)	4.23	2.70	2.47	2.72	3.82	2.23	2.72
Vocational Qualification (%)	40.87	29.84	36.49	37.99	19.71	26.05	28.93
University Degree (%)	14.45	29.00	31.47	29.22	45.36	17.56	30.37
Other Post-School Qualification (%)	4.34	6.81	8.19	7.83	5.73	6.13	6.57
Currently Married (%)	68.03	76.84	76.85	79.5	69.78	78.95	76.25
Years Since Migration (Mean)	/	12.05	15.34	16.66	8.74	10.81	10.17
Experience ¹⁰ (Mean)	17.74	16.79	18.22	18.80	13.72	16.48	16.51
Real Actual Hourly Earnings (Mean)	23.21	23.08	28.80	25.65	20.48	19.15	23.12
Arrived between 1992 and 2003 (%)	/	41.21	27.95	33.69	62.14	37.62	45.60
Arrived after 2003 (%)	/	21.38	30.42	12.38	13.51	21.09	26.98
Number of Observations	42259	12163	1417	2464	1466	2921	3895

Note: Real values are in 2006 New Zealand dollars.

¹⁰ This variable is derived from age and years of schooling by the equation Experience = Age - Years of Schooling - 5.

Table 3 represents the socio-economic characteristics for New Zealand native-born and immigrant males, aged between 20 and 55. The average age of immigrants (37.4) is higher than the average age of New Zealand natives (36.7). Among immigrants, the average age of UK immigrants (39.6) is the highest. Asian immigrants are much younger than New Zealand natives and other immigrants, with an average age of 34.8. The mean marriage rate of immigrants is 76.8%, which is higher than the rate of natives (68%). In addition, the marriage rates of immigrants from all five ethnic groups are higher than the rate for native-born, which implies immigrants are more likely to be married than are New Zealand natives.

As indicated in the above table, 40.9% of the New Zealand native-born hold vocational qualifications, a measure that is around 10% higher than the figure for immigrants. However, immigrants tend to have achieved higher educational attainment, as 29% of immigrants obtained university degrees, compared to about 14% of New Zealand natives who have completed university degrees. Therefore, immigrants are more likely to receive higher education than are natives. Since a greater proportion of New Zealand natives obtained vocational rather than university qualifications, the average labour market experience of the New Zealand native-born (17.7 years) is higher than the figure for immigrants (16.8 years). However, immigrants from the UK are more likely to be experienced than are the New Zealand native-born; the average potential labour market experience of immigrants from the UK is higher than 18 years. This difference is partly due to the higher average age of UK immigrants. Perhaps because Asian immigrants are younger than New Zealand native population, and almost half of them (45%) obtained university degrees, their potential labour market experience (13.7) is the lowest across all ethnic groups, including native-born.

In our sample, around 41.21% of immigrants arrived in New Zealand between 1992 and 2003. It is noteworthy that more than half (62%) of Asian immigrants arrived in New Zealand during that time period. The “years since migration” (YSM) of immigrants from the UK is greater than 15 years and also higher than the figure for other immigrants. Asian immigrants tend to have lived in New Zealand for the shortest period; the mean YSM of this group is only 9 years.

Lastly, the average real hourly earnings of immigrants is NZ\$23.1, and is lower than the average real hourly earnings of the New Zealand native-born (NZ\$23.2). However, the average real hourly earnings (NZ\$25.7) of UK immigrants is higher than the average real hourly earnings of New Zealand natives.

Asian immigrants experience income disadvantages; their average real hourly earnings are around NZ\$20. This difference may partly result from their relatively younger age, and fewer years of experience. Our analysis in the next section provides results that are carefully adjusted for these differences.

2.6. Empirical Results

I have selected the NZIS data over a recent decade from 2000 to 2010, to investigate immigrants' assimilation effect in New Zealand. The nature of this research, and the problem of the endogeneity of "ethnic-spatial lag", has led to the following models being employed: The general model estimates the effects of human capital on individuals' earnings¹¹ in New Zealand by means of OLS (results are provided in Table 4). Ethnic spatial network models examine the effects of ethnic capital (ethnic network and ethnic concentration) on immigrants' earnings in that model. The effect of ethnic network is estimated by the GMM method. The general case is presented first, followed by case studies of the effects of ethnic capital on immigrants in New Zealand. Based on the research objective, the specific effects on Asian, and UK immigrants will then be discussed.

Immigrants' ethnic concentration is argued to be an endogenous variable in previous international studies (e.g. Edin et al., 2003). Therefore, in order to control for the endogeneity of ethnic concentration in this model, I have adopted the lags of ethnic concentration for immigrants. For example, based on the published 1996 New Zealand Census tables, I have worked out the ethnic concentration for immigrants from 2001 to 2005; and I adopt the data from the published New Zealand 2001 Census tables for immigrants' ethnic concentration for the period from 2006 to 2010. Therefore, by doing so, it allows every immigrant a relevant ethnic concentration value in a specific New Zealand region and calendar year as appropriate.

¹¹ In order to control the regional income inequality and the effect of location (e.g. relative cost of living) on individual's earning, I have examined individual's relative income which is equal to the individual's CPI adjusted income divided by the regional CPI adjusted average income. I have also tried to include regional dummies and the regression results suggest a better data fit by relative income approach.

2.6.1 General Case for Males in New Zealand

Table 4 shows the general case of the conventional assimilation model for employed native-born and immigrants using NZIS data. The effects of human capital and individual's characteristics are shown in the table. The analysis also incorporate controls for cohorts of immigrants before and after major immigration changes in 1991.

Since New Zealand's points system came into force through the Immigration Amendment Act 1991, and was supplanted by the "Skilled Migrant Category" policy in 2003, immigrants are divided into three cohorts by their arrival year according to these two policy shocks: immigrants arrived before 1992, between 1992 and 2003, and between 2003 and 2010. The immigrant model (third column) shows that there are quality improvements for immigrant cohorts in New Zealand. The most recent immigrants (who arrived after 2004) perform the best among all immigrant cohorts the most recent cohort (immigrants who arrived between 2001 and 2008), earn a 12% higher hourly wage than immigrants arrived before 1992.

Generally speaking, immigrants' assimilation in New Zealand is confirmed by OLS estimation. The coefficients of "years since migration" (YSM) in the pooled sample (first column) and immigrant sample (last column) are positive and statistically significant. This result shows a significant earning convergence process for immigrants in New Zealand. Moreover, the pooled sample suggests that immigrants' real hourly earnings are growing 0.6% faster than real hourly earnings for the New Zealand native-born. This positive effect is decreasing at a constant rate of 0.01% (coefficient of YSM-squared) per year's stay in New Zealand. In addition, the results confirms that immigrant model shows that YSM is a vital factor for immigrants' earnings growth, as the extra year's living experience in New Zealand corresponds with an increase in immigrants' real

hourly earnings of 1.2%. The effect of YSM found in this study is lower (an average by 1%) than the same coefficient in other international cross-sectional studies in Australia (e.g. Chiswick & Miller, 2002a) and the US (e.g. Borjas, 1995). However, it is consistent with the effect of YSM found in a previous New Zealand studies (see Winkelmann & Winkelmann, 1998).

Labour market experience seems to have a larger effect on immigrants than on the New Zealand native-born. One more years' experience corresponds with an increase in foreign-born workers' earnings of 3.7%, while the rate for New Zealand natives is 3.3%. Married individuals tend to have a higher hourly wage than do unmarried workers in New Zealand. Among all variables, education has the greatest effect on both immigrants' and natives' real hourly earnings. In addition, immigrants who hold university degrees tend to obtain around 42% higher real hourly earnings than do immigrants without any qualifications.

This analysis continue a pattern similar to that in previous New Zealand studies (e.g. Poot, 1993, 1998; Stillman & Maré, 2009; Stillman & Velamuri, 2010; Winkelmann & Winkelmann, 1998). The pooled model suggests that compared with the New Zealand native-born, Asian immigrants experience a substantial income disadvantage. In addition, the immigrant model (third column) indicates that the real hourly earnings of Asian immigrants are the lowest among all immigrant ethnic groups. The OLS estimation suggests that Asian immigrants' real hourly earnings at entry are lower than New Zealand natives by about 29%. The situation for immigrants from the UK is better than the situation for Asian immigrants: UK immigrants' real hourly wage is only 8.2% lower than that of New Zealand natives.

The results of the above model for the specific groups of UK and Asian immigrants is reported and discussed in the next section.

Table 4: OLS Estimates of Log Hourly Wage: Employed Male in New Zealand, Age 20-55, NZIS (2001-2010)

	Pooled Sample	Natives	Foreign-Born
Human Capital			
Experience	0.033*** (0.001)	0.032*** (0.001)	0.037*** (0.002)
Experience –squared	-0.001*** (0.00002)	-0.001*** (0.00002)	-0.001*** (0.00004)
High School Qualification	0.160*** (0.011)	0.157*** (0.012)	0.174*** (0.029)
Vocational Qualification	0.190*** (0.005)	0.186*** (0.005)	0.204*** (0.012)
University Degree	0.461*** (0.007)	0.484*** (0.009)	0.417*** (0.014)
Other Post School Qualification	0.182*** (0.011)	0.183*** (0.013)	0.177*** (0.017)
Personal Characteristics			
Years Since Migration (YSM)	0.006*** (0.002)	/	0.011*** (0.002)
YSM-squared	-0.0001*** (0.00004)	/	-0.0002*** (0.00003)
Married	0.122*** (0.005)	0.133*** (0.005)	0.079*** (0.012)
Arrived 1992-2003	-0.008 (0.018)	/	0.059*** (0.022)
Arrived 2003-2010	0.043 (0.025)	/	0.119*** (0.034)
Asia	-0.287*** (0.026)	/	-0.093*** (0.017)
UK	-0.082* (0.025)	/	0.100*** (0.015)
<i>Reference group</i>	<i>Natives</i>	/	<i>Rest of world immigrants</i>
Observations	54422	42259	12163
Adjusted R-square	0.23	0.22	0.24

Note: (1) Robust standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

(3) Year fixed effects has been applied.

(4) The model also control for Australian, Pacific Islander, rest of world immigrant binary variables.

Table 5 shows the specific effects of human capital on immigrants by country of origin. The effect of YSM on Asian immigrants (the coefficient of YSM is 0.03) is higher than UK immigrants. It suggests that compared to UK immigrants, the assimilation effect (“catch up” effect) for Asian immigrants is significantly stronger; and also shows that the living and working experiences gained in New Zealand are significantly more important for immigrants from non-English speaking countries than those immigrants from the traditional source country such as the UK. Furthermore, with one more year’s labour market experience, UK immigrants’ real hourly earnings will be increased by 4%. The effect of potential labour market experience on Asian immigrants (3.1%), is lower than it is for UK immigrants. However, Asian immigrants benefit from university education, as Asian university degree holders will earn a 42% higher salary than their counterparts.

Table 5: OLS Estimates of Log Hourly Wage by Country of Origin: Employed Male Immigrants in New Zealand, Age 20-55, NZIS (2001-2010)

	UK	Asia
Human Capital		
Experience	0.040*** (0.004)	0.031*** (0.004)
Experience –squared	-0.001*** (0.0001)	-0.001*** (0.0001)
High School Qualification	0.262*** (0.083)	0.126** (0.06)
Vocational Qualification	0.128*** (0.025)	0.156*** (0.050)
University Degree	0.378*** (0.032)	0.420*** (0.032)
Other Post School Qualification	0.113** (0.046)	0.141*** (0.056)
Personal Characteristics		
Years Since Migration (YSM)	0.012*** (0.005)	0.028*** (0.005)
YSM-squared	-0.0002*** (0.0001)	-0.0004*** (0.0001)
Married	0.118*** (0.025)	0.064** (0.029)
Arrived 1992-2003	0.052 (0.056)	0.056 (0.052)
Arrived 2003-2010	0.076 (0.077)	0.275*** (0.0784)
Observations	2464	1466
Adjusted R-square	0.20	0.26

Note: (1) Robust standard errors in parentheses
 (2) * p<0.10 ** p<0.05 *** p<0.01
 (3) Year fixed effects has been controlled.

The quality changes of cohorts for UK immigrants are not statistically significant. However, significant quality improvement for Asian immigrants' cohorts has been observed in this study. Asian immigrants who arrived after 2003 earn, as a group, 28% more than previous Asian immigrants. As a result, the empirical evidence of cohort effects indicates that the recent series of adjustments in New Zealand's immigration

policy have improved significantly improved the skills quality of Asian immigrants that are received by New Zealand.

2.6.2 The Effects of Ethnic Capital on Male Employees in New Zealand

Table 6 shows the coefficients of two ethnic-capital variables on employed males in New Zealand. The first column reports the returns to ethnic and human capital on the New Zealand natives' real hourly earnings. The second, third and fourth columns show the effects of an ethnic network, and ethnic concentration on immigrants' real hourly wage growth; while the last model (last column) considers the joint effect of these two variables.

The significantly positive coefficient of ethnic network is observed in the spatial model. Regression results confirm that the spatial model offers three advantages when compared to the conventional model:

(1) The spatial model provides a better estimation of the impact of human capital and personal characteristic variables on immigrants' assimilation processes when network effect is present. By controlling for spatial dependence, the estimates of those explanatory variables have been significantly changed. For example, the spatial model suggests smaller effects of human capital variables rather than the effects suggested by the conventional model in Table 4. As a result, the conventional model (which does not allow for spatial dependence) tends to either over- or under-estimate the effects of those socio-economic variables when the network effect is present.¹²

¹² More details about this point can be found in the section of 2.4.2: Ethnic Spatial Network Approach.

(2) A better data fit is offered by the spatial model. The spatial model always generates the higher adjusted R-square and significant F-test of restrictions, which means the spatial model is the preferred approach to model immigrants' earnings.

(3) It captures more accurately the effect of networks. The coefficient of weighted ethnic-spatial lag (named "ethnic network") is highly significant, which indicates that immigrants' earnings remain correlated, ethnically and spatially, after controlling for other socio-economic variables. A positive coefficient of weighted ethnic-spatial lag indicates ethnic network plays a positive role in relation to assimilation. However, the conventional approach (the second column in Table 6, which was adopted as the proxy for ethnic network in prior studies) fails to capture that positive effect of network; and we may mistakenly conclude that the effect of ethnic network on immigrants' assimilation processes is negative. Likewise, in this study, I claim that the effect of ethnic concentration represents the net effect of "substitution effect" and "complement effect" for immigrants when the ethnic network variable has been controlled for (as shown in the last column in Table 6). The regression result implies that based on the positive ethnic network effect, immigrants are in balance complementary to each other in New Zealand.

The native model (in the first column of Table 6) shows the effect of an ethnic network for employed native males. The coefficient of ethnic network effect (the log of the spatial hourly wage, also known as ethnic-spatial lag) suggests that employed native males' real hourly wages are highly correlated, as the correlation of their real hourly wages is about 0.59, which also indicates a very strong economic network in the natives' place of residence.

Both of the immigrant models (in the second and third column) suggest a strong and significant general ethnic network effect on immigrants' labour market performance in New Zealand. However, immigrants' network effect is not as strong as the network effect for New Zealand natives. The coefficient of immigrants' network effect recorded in the second and third column is around 0.40. It means that immigrants benefit from their ethnic network, as it generates economic resources for them. In addition, the third immigrant column (last column) provides implications concerning the joint effects of ethnic network and ethnic concentration on immigrants' wage growth in New Zealand. I cannot observe a significant negative effect of substitution for immigrants in New Zealand generally; as the coefficient of ethnic concentration suggested by that model is not statically significant.

Table 6: GMM Estimates of Log Hourly Wage with Network Effect: Employed Male in New Zealand, Age 20-55, NZIS (2001-2010)

	Natives	(1)	Foreign-Born (2)	(3)
Ethnic Capital				
Ethnic Network Effect	0.59*** (0.04)	/	0.41*** (0.04)	0.40*** (0.04)
Ethnic Concentration	/	-0.48*** (0.008)	/	-0.01 (0.01)
Human Capital				
Experience	0.03*** (0.001)	0.04*** (0.002)	0.03*** (0.002)	0.03*** (0.002)
Experience -squared	-0.001*** (0.00002)	-0.001*** (0.0001)	-0.001*** (0.0001)	-0.001*** (0.0001)
High School Qualification	0.19*** (0.01)	0.17*** (0.03)	0.18*** (0.03)	0.17*** (0.03)
Vocational Qualification	0.19*** (0.01)	0.20*** (0.01)	0.18*** (0.01)	0.18*** (0.01)
University Degree	0.49*** (0.01)	0.42*** (0.01)	0.4*** (0.01)	0.4*** (0.01)
Other Post School Qualification	0.18*** (0.01)	0.17*** (0.02)	0.17*** (0.02)	0.17*** (0.02)
Personal Characteristics				
Years Since Migration (YSM)	/	0.01*** (0.002)	0.01*** (0.002)	0.01*** (0.002)
YSM-squared	/	-0.0002*** (0.00004)	-0.0002*** (0.00004)	-0.0002*** (0.00004)
Married	0.13*** (0.01)	0.08*** (0.01)	0.07*** (0.01)	0.07*** (0.01)
Arrived 1992-2003	/	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)
Arrived 2003-2010	/	0.12*** (0.03)	0.1*** (0.03)	0.1*** (0.03)
Asia	/	-0.08*** (0.02)	-0.06*** (0.02)	-0.05*** (0.02)
UK	/	0.13*** (0.02)	0.05*** (0.02)	0.06*** (0.02)
Observations	42259	12163	12163	12163
Adjusted R-square	0.24	0.25	0.27	0.27

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

(3) Year fixed effects has been controlled.

(4) Australian, Pacific Islander, rest of world immigrant binary variables have been controlled for as well.

2.6.3 The Effects of Ethnic Capital by Country of Origin

Table 7 provides regression results for UK and Asian immigrants based on the third immigrant model (the last column in Table 6) which shows the joint effects of ethnic network and concentration.

As with the general case, when the effects of ethnic capital (ethnic network and ethnic concentration) have been controlled for, most of the coefficients of human capital variables are slightly stronger from the basic models' regression results provided in Table 5. Furthermore, the adjusted R-Square has been improved by the ethnic spatial network approach, compared to the OLS estimations for the basic model in Table 5 which suggests that the GMM estimator provides a better estimation in this case.

Firstly, immigrants from these two ethnic groups enjoy a positive ethnic network effect on their wage growth in New Zealand. However, compared to the coefficient of ethnic network on immigrants from the UK (0.51), the same positive coefficient on Asian immigrants (0.32) is relatively smaller. The relatively smaller coefficient of network for Asian immigrants may help us to understand why Asians have not achieved an assimilation pattern similar to that achieved by the traditional immigrant groups in New Zealand. These results indicate that the smaller ethnic network effect for Asian immigrants suggest that they need a stronger and tiered economic network to assist them to be assimilated.

In addition to the network effect, I cannot observe any significant negative effects of ethnic concentration on immigrants' assimilation in New Zealand.¹³ This analysis based on a careful examination of ethnic network effects has provided results which confirms the hypothesis that immigrants are not substitutes to each other. An

¹³ I have tested the effect of ethnic concentration individually based on the basic model; the coefficients of ethnic concentration on all immigrant groups are not statistically significant.

implication of this result is that immigrants are not competing for scarce employment opportunities in the New Zealand labour market.

Table 7: GMM Estimates of Log Hourly Wage for the Major Immigrant Groups: Employed Male Immigrants, Age 20-55, NZIS (2001-2010)

	UK	Asia
Ethnic Capital		
Ethnic Network Effect	0.51*** (0.16)	0.32*** (0.09)
Ethnic Concentration	0.01 (0.04)	-0.02 (0.02)
Human Capital		
Experience	0.04*** (0.004)	0.03*** (0.004)
Experience –squared	-0.001*** (0.0001)	-0.001*** (0.0001)
High School Qualification	0.28*** (0.08)	0.15*** (0.05)
Vocational Qualification	0.14*** (0.4)	0.13*** (0.03)
University Degree	0.4*** (0.03)	0.4*** (0.03)
Other Post School Qualification	0.15*** (0.04)	0.14*** (0.05)
Personal Characteristics		
Years Since Migration (YSM)	0.01*** (0.005)	0.03*** (0.005)
YSM-squared	-0.0003*** (0.00008)	-0.0004*** (0.0001)
Married	0.12*** (0.02)	0.03 (0.03)
Arrived 1992-2003	0.07 (0.05)	0.05 (0.05)
Arrived 2003-2010	0.09 (0.07)	0.26*** (0.08)
Observations	2464	1466
Adjusted R-square	0.25	0.26

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

(3) Year fixed effects has been controlled.

2.6.4 Sensitivity Check

In this section, I examine the effect of ethnic capital on immigrants' assimilation processes and the effectiveness of the ethnic spatial network model by using an alternative dataset, namely the Australian longitudinal data set - The Household, Income and Labour Dynamics in Australia (HILDA). In order to control the endogeneity issues, an Instrumental Variable (IV) Estimator is normally applied. In this study, I employ another approach – Hausman-Taylor (HT) Estimation (1981). Hausman and Taylor (1981) have developed an econometric model for panel data, which allows controlling for endogeneity and at the same time the investigation of the effect of time-invariant variables. HT Estimation characterises Fixed-Effect (FE), Random-Effect (RE), and OLS estimations. For example:

$$y_{it} = x1'_{it}\beta_1 + x2'_{it}\beta_2 + z1'_i\gamma_3 + z2'_i\gamma_4 + u_i + e_{it} \quad (30)$$

$$\text{where, } E(e'_{it}|x1'_{it}, x2'_{it}, z1'_i, z2'_i) = 0, E(u_i|x1'_{it}, z1'_i) = 0 \quad (31)$$

$$Cov(u_i, x1'_i) = 0, \text{ but } Cov(u_i|x2'_i) \neq 0$$

$$Cov(u_i, z1'_i) = 0, \text{ but } Cov(u_i|z2'_i) \neq 0$$

Therefore, this model contains time-variant variables, time-invariant variables and potentially endogenous variables. The FE model cannot estimate the coefficients γ_3 and γ_4 of time-invariant variables $z1$ and $z2$. At the same time, the RE model is not efficient to estimate all of the effects since $x2$ and $z2$ are correlated with u .

However, the HT Estimation (1981) provides a solution. It follows three steps to estimate the coefficients:

(1) Estimate the above model by Fixed-Effect estimation with instruments ($x1_{it}$ and $z1_i$) to obtain $\widehat{\beta}_{1FE-IV}$, $\widehat{\beta}_{2FE-IV}$ and \widehat{e}_{it} .

(2) Regress \widehat{e}_{it} on $z1_i$ and $z2_i$ with instrumental variables $x1_{it}$ and $z1_i$ by OLS in order to estimate $\widehat{\gamma}_{3IV}$, $\widehat{\gamma}_{4IV}$; then it allows us to calculate $\widehat{\sigma}_e^2$ and the Random-Effects estimator θ_i .

(3) Derive the GLS transformation with θ_i and estimate the whole model by Random-Effect.

By investigating the bias and RMSE¹⁴ properties of OLS, HT, FE, RE and pretest estimators from the Monte Carlo experiments, Baltagi et al. (2003) argued that “OLS standard errors are biased and yield misleading inference under both a RE and HT world.” When $\rho \neq 0$ (ρ is the “proportion of the total variance due to the individual effects”), HT, pretest and FE are the best estimation to estimate the coefficients of endogenous time-varying variables; HT is one of the best methods to estimate the coefficients of endogenous time-invariant variables. In addition, they found that with the increase in individual effect, the bias for OLS and RE for the coefficients of the endogenous time-invariant variables and the corresponding RMSE will also be increased. In addition, HT estimation overcomes disadvantages of traditional instrumental variable (IV) estimation. As Ruiz, Gomez, and Narvaez (2010) showed, efficient instruments need to satisfy three conditions: (1) rank condition, i.e. instruments must correlate with endogenous variables but not the error term; (2) exclusion restriction, i.e. instruments should be “legitimately excluded” from the earning function; (3) order condition, i.e. instruments need to be more numerous. However, without additional information provided by instruments; based on the nature of panel data, HT estimation can provide

¹⁴ Root-Mean-Square Error.

consistent and efficient measurement of the effects of assimilation and ethnic capital on immigrants in this case.

I have examined immigrants' assimilation processes in Australia by using the HILDA Survey. It is a household-based panel study which began in 2001. The wave 1 panel consisted of 7,682 households and 19,914 individuals. HILDA contains dynamic information about surveyed Australian natives' and immigrants' income, education, ethnicity, residence location, occupation, and family. In addition, HILDA divides Australia into 13 major statistical regions (MSRs). HILDA also provides fully detailed information about where immigrants come from.

A merged longitudinal data set is created based on data from the first eight waves of HILDA (from 2001 to 2008), and adopted in this study. In order to examine immigrants' labour market performance in Australia, only observations of full-time employed male immigrants and natives aged between 25 and 55 years have been utilised.¹⁵ I used a balanced panel data set. Since some respondents refused to answer some questions, resulting in missing data, those individuals and the corresponding observations have been dropped from the data set. Because there are new, added and dropped respondents in each wave of the survey, longitudinal weights are applied in all regressions. As a result, the merged longitudinal data set contains 12,782 observations and 2,357 individuals; among them there are 517 immigrants, who contributed 2,662 observations.

I augmented our data set by incorporating ethnic concentration. Since HILDA collects information about the country of origin of individuals, it is possible to classify ethnic groups by parents' country of origin. However, the published 2001 and 2006

¹⁵ Students are excluded (e.g. Stillman & Maré, 2009).

Australian Census data reports only information about individuals' country of birth. Therefore, in order to incorporate the Australian census data with HILDA, the ethnicity of an individual will be classified by that individual's country of birth.

Immigrants from different ethnic backgrounds and countries of origin may have different assimilation processes. Thus, in order to examine the effect of ethnic capital on immigrants, they have been divided into five major groups, based on considerations of geography, and language. Asians and New Zealanders have been grouped as two single groups; while, due to the language effect, immigrants from the UK and Ireland have been categorised into one group, and immigrants from other European countries are all placed in a fourth group; the "rest of world" category contains all other immigrants.

An individual is categorised as being high-skilled if that person has obtained at least an advanced diploma or bachelor degree (e.g. Maani, 2004; Maani & Maloney, 2004). Since HILDA reports the age at which an individual left school, potential labour market experience is calculated by current age minus age at leaving school as in other research (Gladden & Taber, 2002; Schultz, 1997). The wage has generally been considered as a good indicator of an individual's labour market performance by previous studies (e.g. Borjas, 1985); thus, in this case real hourly wage will be examined. Their hourly wage is derived from HILDA by dividing weekly salary from an individual's main job by hours of work in that job. Furthermore, hourly wage has been adjusted by the Australian CPI¹⁶.

To incorporate ethnic concentration information across Australia, I use the Australian census for this data. I derived one of our two ethnic capital variables (ethnic concentration) from the published 2001 and 2006 Australian Census tables (Australian

¹⁶Base year is 1990.

Bureau of Statistics, 2006, 2007). This ethnic capital variable is measured at the Australian Major Statistical Region (MSR) level¹⁷. I incorporated this data into HILDA data to examine immigrants' assimilation effect in Australia.

Ethnic concentration is defined in this study as:

$$ethcon_{ij} = \frac{Population_{ij}}{Population_j} \quad (32)$$

where “*i*” denotes ethnic group (classified by country of origin), and “*j*” represents a specific region (at MSR level, totalling 13 regions) in Australia. There are 51 countries of origin reported in the census.

Due to adjustments in Australian immigration policy during the past three decades, the structure of the immigrant population in Australia has been profoundly changed in relation to many aspects, such as country of origin, language skill, and education level. Therefore, in our analyses recent immigrants are examined as a separate group in order to better show the characteristics of recent and earlier immigrants. Recent immigrants are defined as immigrants who arrived in Australia after 1991.

¹⁷Which is consistent with the location information reported by HILDA.

Table 8: Descriptive Statistics for Employed Male, Age 25-55, HILDA (Wave 1-8)

	Australia- Born	Recent Immigrants	Earlier Immigrants
Age	39.3	37.8	43.3
High Skilled (%)	32.6	53.6	39.2
Married (%)	80.1	80.4	84.8
Age at First Arrival	-	29.1	16.4
Years Since Migration	-	8.6	26.9
Experience (potential)	22.8	20.6	26.4
Log of Real Hourly Wage in Main Job for High-Skilled*	2.9	2.8	2.9
Log of Real Hourly Wage in Main Job for Low-Skilled*	2.6	2.5	2.6
Born in Main English Speaking Countries (%)	-	41.3	57.7
Born in Rest of Europe	-	8.0	14.1
Born in Asia	-	34.0	20.1
Born in the Rest of World	-	16.8	8.1
Arrived between 2001 and 2008 (%)	-	9.7	-
Arrived between 1991 and 2000 (%)	-	90.3	-
Arrived between 1981 and 1990 (%)	-	-	44.6
Arrived between 1971 and 1980 (%)	-	-	24.0
Arrived before 1971 (%)	-	-	31.4
Number of Observations	10120	739	1923

Note: * All wages are adjusted by Australian CPI.

Table 8 represents the socio-economic characteristics for full-time employed native and immigrant males aged between 25 and 55 in that study. The average age of recent immigrants is less than the average age of native males, while the average age of earlier immigrants is likely to be greater than that of both natives and recent male immigrants. It is noteworthy that half of the full-time employed recent male immigrants are high-skilled; this figure (53.61%) is higher than the corresponding figure for both natives (32.64%) and earlier immigrants (39.18%). However, earlier immigrants are more likely to be married; about 84.76% of them are married. Compared to earlier immigrants, recent immigrants arrived in Australia at an older age (29) than the earlier cohorts (16).

Recent immigrants earned less than Australian native-born workers with regard to their hourly wages. Most immigrants are from “main English-speaking countries”¹⁸, followed by Asian countries.

The main equation estimated in this section examines the effects of ethnic capital, by incorporating ethnic concentration and a spatial-weighted matrix effect of group characteristics as below:

$$y = \alpha l_n + \rho W y + M e t h y + X \beta + \varepsilon \quad (33)$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

Based on potential measurement error, selection bias, and other biases caused by un-observability (e.g. ability), some human capital variables (skill levels, English proficiency, and marital status) are treated as endogenous in our earnings models, as they have been in previous economic analyses (e.g. Card, 1999, 2000; Chiswick & Miller, 1995, 1999; García, Molina, & Navarro, 2008; Ruiz et al., 2010). Moreover, due to neighbourhood effects and selection bias, the variable of ethnic concentration and ethnic network are also identified as endogenous (see Clark & Drinkwater, 2000a; Edin et al., 2003).

I firstly examined the effects of ethnic capital, human capital, and other socio-economic variables on individuals’ economic performance in Australia by OLS estimations.

Generally speaking, immigrant assimilation in Australia is confirmed by OLS estimations. The coefficients of “years since migration” (YSM) in all models suggest that

¹⁸It refers to the UK, Ireland, New Zealand, US, Canada, and South Africa.

the hourly wage of immigrants is growing at a faster rate than that of natives by about 2% (when cohort effects have been controlled); at the same time, this rate is decreasing at a constant rate of around 0.02% (coefficients of YSM-square) per year's stay in Australia. This finding is consistent with other OLS studies in Australia (e.g. Chiswick & Miller, 2002b) and the US (e.g. Borjas, 1995). When immigrants are pooled with natives, potential labour market experience increases wages for both natives and immigrants at a rate of 2% per year and this rate is also decreasing, by 0.04% annually. However, when I study this effect on immigrants only, the OLS estimation suggests a smaller effect of experience on immigrants' earnings than the general case and decreasing at a slower rate. Generally, married immigrants and natives tend to have a higher hourly wage than do unmarried individuals. Personal English skill and education level helps both male natives and immigrants to receive a higher hourly wage.

Table 9: OLS Estimates of Log Hourly Wage: Full-time Employed Male Australian Natives and Immigrants, Age 25-55, HILDA (Wave 1-8)

	Pooled Sample	Foreign-Born		
		(1)	(2)	(3)
Human Capital				
Potential Experience	0.0206*** (0.00254)	0.0120** (0.00575)	0.0126** (0.00574)	0.0128** (0.00574)
Potential Experience -squared	-0.000368*** (0.0000542)	-0.000126 (0.000120)	-0.000140 (0.000120)	-0.000143 (0.000120)
Proficiency in English	0.339*** (0.0504)	0.354*** (0.0560)	0.344*** (0.0560)	0.354*** (0.0563)
High Skilled	0.302*** (0.00850)	0.294*** (0.0188)	0.296*** (0.0187)	0.301*** (0.0189)
Personal Characteristics				
Years Since Migration (YSM)	0.0174*** (0.00442)	0.0168*** (0.00483)	0.0162*** (0.00482)	0.0155*** (0.00484)
YSM-squared	-0.000177** (0.0000772)	-0.000198** (0.0000843)	-0.000182** (0.0000842)	-0.000171** (0.0000844)
Married	0.133*** (0.00947)	0.0938*** (0.0224)	0.0884*** (0.0224)	0.0904*** (0.0224)
Immigrant	-0.422*** (0.0898)	/	/	/
Arrived 2001-2008	0.441*** (0.0935)	0.429*** (0.102)	0.443*** (0.102)	0.431*** (0.102)
Arrived 1991-2000	0.247*** (0.0680)	0.229*** (0.0741)	0.233*** (0.0739)	0.237*** (0.0739)
Arrived 1981-1990	0.149*** (0.0524)	0.130** (0.0574)	0.139** (0.0573)	0.143** (0.0573)
Arrived 1971-1980	0.177*** (0.0393)	0.171*** (0.0429)	0.181*** (0.0429)	0.185*** (0.0429)
Arrived Before 1971	Ref.	Ref.	Ref.	Ref.
Ethnic Capital				
Ln (Network Average Hourly Wage)	/	/	0.00856*** (0.00239)	0.00666** (0.00263)
Ln (Ethnic Concentration)	/	/	/	0.0134* (0.00768)
Constant	1.916*** (0.0578)	1.597*** (0.131)	1.595*** (0.131)	1.644*** (0.134)
Observations	12782	2662	2662	2662
R-square	0.125	0.129	0.132	0.133
Breusch-Pagan Test (Chi-square)	15925.15	3006.74	2990.09	2968.76

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

(3) For native-born, the age effect has been controlled.

The network effects on immigrants' earnings assimilation are significant and their hourly earnings have a spatial correlation of approximately 0.007. Immigrants benefit from being spatially concentrated in Australia; that is, the coefficient of ethnic concentration is about 0.013 and it is statistically significant at 10% level.

In order to control for the endogeneity of ethnic network variable (the spatial-lag term) for immigrants, I have estimated all four models by Hausman and Taylor (1981) estimation. Table 10 provides the regression results by HT estimations. Overall, when I applied the HT estimation on HILDA data, some effects of endogenous variables are shown to be weaker than the OLS results; and the coefficients of exogenous variables are much stronger than the results from OLS estimations. In addition, now the coefficient of personal English skill is about 0.026 in the pooled sample case, and around 0.009 in the immigrants' case. The effect of skill level is also much weaker now in both the general and the immigrants' case. However, the first model suggests a much stronger initial earning disadvantage for immigrants. In addition, all models suggest a stronger assimilation effect on immigrants, now the coefficients of YSM are around 0.04. This result is very close to Beenstock et al.'s (2010) study on a panel model; and confirms that panel models suggest a much stronger effect of assimilation than do OLS models. As a result, the length of time they have been in the host country is likely to affect their search for sufficient information for the local labour market and develop their social networks.

Table 10: Hausman-Taylor Estimates of Log Hourly Wage: Full-time Employed Male Australian Natives and Immigrants, Age 25-55, HILDA (Wave 1-8)

	Pooled Sample	(1)	Foreign-Born (2)	(3)
Human Capital				
Potential Experience	0.0453*** (0.0000760)	0.0426*** (0.000187)	0.0421*** (0.000186)	0.0422*** (0.000186)
Potential Experience -squared	-0.000637*** (0.00000157)	-0.000779*** (0.00000366)	-0.000769*** (0.00000365)	-0.000771*** (0.00000365)
Proficiency in English	0.0259*** (0.00153)	0.00548*** (0.00168)	0.00910*** (0.00168)	0.00891*** (0.00168)
High Skilled	0.138*** (0.000842)	0.0424*** (0.00210)	0.0422*** (0.00209)	0.0455*** (0.00209)
Personal Characteristics				
Years Since Migration (YSM)	0.0426*** (0.000105)	0.0536*** (0.000135)	0.0541*** (0.000135)	0.0537*** (0.000135)
YSM-squared	-0.000491*** (0.00000208)	-0.000486*** (0.00000239)	-0.000491*** (0.00000238)	-0.000486*** (0.00000239)
Married	0.0501*** (0.000277)	0.177*** (0.000667)	0.177*** (0.000666)	0.177*** (0.000666)
Immigrant	-0.999*** (0.00246)	/	/	/
Arrived 2001-2008	1.093*** (0.00401)	1.465*** (0.00508)	1.496*** (0.00505)	1.494*** (0.00505)
Arrived 1991-2000	0.703*** (0.00233)	1.026*** (0.00307)	1.039*** (0.00306)	1.050*** (0.00307)
Arrived 1981-1990	0.383*** (0.00207)	0.620*** (0.00266)	0.631*** (0.00264)	0.640*** (0.00266)
Arrived 1971-1980	0.265*** (0.00201)	0.418*** (0.00247)	0.425*** (0.00245)	0.432*** (0.00246)
Arrived Before 1971	Ref.	Ref.	Ref.	Ref.
Ethnic Capital				
Ln (Network Average Hourly Wage)	/	/	0.00872*** (0.0000595)	0.00824*** (0.0000611)
Ln (Ethnic Concentration)	/	/	/	0.0181*** (0.000533)
Constant	1.922*** (0.00180)	0.608*** (0.00366)	0.586*** (0.00365)	0.660*** (0.00425)
Observations	12782	2662	2662	2662
sigma_u	0.5446	0.6780	0.6720	0.6724
sigma_e	0.2579	0.2880	0.2874	0.2874
rho	0.8168	0.8472	0.8454	0.8456
Wald Chi-square	1.47E+06	6.90E+05	7.14E+05	7.15E+05

Note: (1) Standard errors in parentheses
 (2) * p<0.10 ** p<0.05 *** p<0.01
 (3) For native-born, the age effect has been controlled.

In addition, all models on cohort effects confirmed a more significant improvement in the quality of immigrants than the OLS estimation suggests. The HT estimations suggest a stronger correlation in immigrants' hourly wage (now the coefficient is 0.008) than the OLS does. Compared to a weak significant positive effect of ethnic concentration on immigrants' hourly earnings (under OLS estimations), under the HT estimations, this effect becomes highly significant and larger (0.02).

Both OLS and HT estimations suggest a positive and significant network effect on immigrants' earnings. This finding confirms the hypotheses about the effect of a network on immigrants' assimilation processes: that is, their labour market performance is not independent and identically distributed; and their wages are correlated with each other and social networks act positively on immigrants' assimilation. However, the correlation of their hourly earnings is very low which suggests that they may need a stronger linkage and network to help their economic assimilation. Overall, immigrants benefit from spatial concentration, as such concentration is likely to result in more resources they can access once the ethnic population in a specific region is sufficiently large; therefore, when I take account of the overall ethnic capital effects, ethnic capital acts positively on immigrants' hourly wage and confirms the hypotheses of ethnic capital.

Moreover, following the method of Ruiz et al., (2010), the Breusch-Pagan test (1980) has been applied on OLS residuals. The results suggest that the variance of individual effect α is not zero. In addition, from the HT estimations of ρ I can see that the unobservable individual error term is around 80% of the total error variance. Therefore, from the test results, one can conclude that the OLS estimator is not efficient. The HT estimator adopts the features of both a Fixed-Effect and Random-Effect model; and it provides the measurements of time-invariant variables as well as controls for endogeneity.

Therefore, I think the HT estimation provides a better understanding of the effects of assimilation and ethnic capital on panel data. Moreover, I have done some case studies to show the specific effect of ethnic capital on different ethnic groups in Australia.

Table 11 summarises the specific effects of human capital by country groups. Results for immigrants from Asia, and the UK are considered individually. Since all immigrant respondents from the UK in our sample indicated they speak only English at home, I treat them as proficient in English and therefore have dropped the dummy variable of “proficiency in English”.

Table 11: Hausman-Taylor Estimates of the Effects of Ethnic Capital on Log Hourly Wage: Full-time Employed Male Immigrants in Australia, Age 25-55, HILDA (Wave 1-8)¹⁹

	Native-Born	Asia	UK
Human Capital			
Potential Experience	0.0415*** (0.0000847)	0.0433*** (0.000396)	0.0229*** (0.000364)
Potential Experience -squared	-0.000467*** (0.00000176)	-0.00113*** (0.00000828)	-0.000270*** (0.00000643)
Proficiency in English	0.0498*** (0.00876)	0.0222*** (0.00215)	/
High Skilled	0.189*** (0.000865)	0.0899*** (0.00707)	0.0324*** (0.00222)
Personal Characteristics			
Years Since Migration (YSM)	/	0.0550*** (0.000290)	0.0547*** (0.000290)
YSM-squared	/	-0.000224*** (0.00000634)	-0.000658*** (0.00000408)
Married	0.0258*** (0.000298)	0.463*** (0.00153)	0.00718*** (0.00122)
Arrived 2001-2008	/	1.458*** (0.0119)	1.542*** (0.0129)
Arrived 1991-2000	/	1.262*** (0.00849)	0.715*** (0.00698)
Arrived 1981-1990	/	0.766*** (0.00756)	0.451*** (0.00434)
Arrived 1971-1980	/	0.634*** (0.00697)	0.428*** (0.00405)
Arrived Before 1971	/	Ref.	Ref.
Ethnic Capital			
Ln (Network Average Hourly Wage)	0.176*** (0.00137)	0.0126*** (0.000127)	0.105*** (0.00139)
Ln (Ethnic Concentration)	-0.200*** (0.00252)	0.0244*** (0.000835)	-0.0604*** (0.00251)
Constant	1.516*** (0.00929)	0.315*** (0.0102)	0.692*** (0.00907)
Observations	10120	638	826
sigma_u	0.4970	0.7230	0.7468
sigma_e	0.2475	0.3379	0.2486
rho	0.8013	0.8208	0.9002
Wald Chi-square	1.03E+06	3.36E+05	1.37E+05

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

(3) For native-born model, we have controlled the age effect.

¹⁹ The effects of ethnic capital have also been examined for immigrants from English-speaking countries, New Zealand, and rest of world individually. More details are provided in Appendix B.

Generally speaking, the effects of YSM on immigrants from different countries are very similar, at approximately 0.05. However, the effects of experience are different. The effect of experience on immigrants from Asia is stronger than for UK immigrants. Immigrants with good English skill significantly increase their hourly wage, such as Asian immigrants, the coefficient is 0.03. Married Asian immigrants tend to obtain a higher hourly wage than other immigrants. Immigrants from the UK have the stronger network effect (0.105) than Asian immigrants (0.0126).

The effects of ethnic concentration on immigrants with more mixed cultures and those different from Australian culture and language tend to be higher. For example, the coefficient of ethnic concentration for immigrants from Asia is 0.02 and for the UK is -0.06.

For the effects of ethnic capital on immigrants' hourly earnings I find three interesting results: (1) the network effect is larger for immigrants from the UK; (2) in relation to immigrants that have similar language and cultural background with Australia – the effects of ethnic concentration on these immigrants are negative and highly significant; (3) however, the ethnic concentration and network effects on Asian immigrants are significantly positive and strong.

Immigrants from the UK that speak the same language and share the same culture with Australia seem to have higher social and economic correlations; furthermore, they have a stronger network and are more economically linked. On the other hand, immigrants from Asia are significantly better off once they concentrate their location in a specific region in Australia. When more immigrants (from countries that speak a different language from, and have a different culture to Australia) are located in the same

region, they will “generate” demand for immigrant labour for themselves and off-set the initial disadvantages in the Australian labour market to some extent.

As a result, empirical findings of OLS and HT estimations confirmed the effects of ethnic capital on immigrants’ labour market performance in Australia. Ethnicity and language proficiency is further shown to be important for the assimilation process of immigrants. I further find that the network variable plays a positive and significant effect on wage growth in all cases. A stronger social network and linkage helps immigrants to achieve better economic performance and more successful assimilation. In addition, immigrants from the same cultural and language background as Australia (e.g. the UK) are more economically correlated compared to other immigrants.

Some recent international studies have observed negative effects of ethnic concentration (Bertrand et al., 2000; Warman, 2007). Cutler and Glaeser (1997) in contrast have shown that African Americans in the US received significantly higher wages once they lived in highly integrated areas (i.e. diverse, not concentrated). The empirical findings of that study show a similar pattern in Australia. I find that immigrants with a different cultural and language background from the Australian culture and language benefit from concentration and networking in a specific region in Australia. In addition, our study shows that when I controlled for ethnic network effects and ethnic concentration, both factors have significant effects for all immigrant groups. Finally, I strongly suggest greater attention should be given to the role of ethnic capital and immigrant networks on the assimilation process of immigrants.

2.7. Summary

New Zealand is traditionally a country of immigrants, and it is therefore, of special analytical and policy interest. New immigrants may face some disadvantages in finding a job in New Zealand. However, ethnic capital (e.g. network and ethnic concentration) could help immigrants to overcome those disadvantages to some extent. Therefore, by choosing a specific location, immigrants may benefit from ethnic capital and face fewer barriers in finding a job.

Previous international studies adopt either ethnic concentration or language as a proxy of immigrants' network in the host country (e.g. Chiswick & Miller, 1996). In comparison with these studies, I adopt the "ethnic spatial network approach" to account for ethnic concentration and networks in order to capture the effects of social and resource networks for immigrant groups. I incorporate different measures of ethnic capital, in particular, ethnic group economic resources and spatial ethnic concentration.

In Essay One, I have constructed a "Spatial-Lag Matrix" with micro data, which is based on three conditions: (1) ethnic group, (2) region of residence, and (3) year of survey. This approach extends the international literature for more realistic modelling approach and better understanding the migrants' network effect. Moreover, I employ the Generalized Method of Moments (GMM) Estimation to correct for heteroscedasticity, and account for endogeneity in immigrants' networks to examine the effects of ethnic capital and human capital using ten-year NZIS data. Regression results show that the models which do not allow for ethnic network may under- or over-estimate the effects of other socio-economic variables. The spatial model also provides a better data fit.

The empirical findings of immigrant employed males confirmed the effects of ethnic capital on their labour market performance in New Zealand. The results of this

study confirm the precious assimilation effect in New Zealand that UK immigrants achieved a much more successful assimilation process than Asian immigrants. In addition, the return of labour market experience for UK immigrants is higher than for Asian immigrants.

I find that ethnic capital is important in immigrants' assimilation process, based on data analysis of both ethnic network and ethnic concentration effects. One of the hypotheses of ethnic capital described and supported by the analysis is that ethnic capital works differently across ethnic groups. In addition, ethnic networks play a positive role on individual's wage growth in most cases. It is remarkable that the effects of network on native-born workers are much stronger than immigrants in New Zealand. It implies that the transmission and transformation of human capital and social resources among immigrants are not as efficient as for natives in New Zealand. It seems that immigrants need a much stronger social network and linkage for greater economic success. In addition to the network effect, ethnic concentration has no effect on immigrants' assimilation in New Zealand which also indicates that immigrants are not substitutes to each other. This result further implies that immigrants are not competing for scarce employment opportunities in the New Zealand labour market.

As a result, as is hypothesised, immigrants share social capital and economic resources through their ethnic network in New Zealand. Therefore, their labour market performances are positively and significantly correlated with each other. Overall, this research provides an attempt to examine the effects of ethnic capital and has confirmed the hypotheses of ethnic capital. The results of this study strongly suggest that more attention to the role of ethnic capital on immigrants' assimilation process is warranted.

Chapter 3.

Essay Two: Ethnic Capital and Immigrant Entrepreneurship

3.1. Introduction

Two of the labour market's assimilation outcomes are of special interest to labour economists and policy makers: employment assimilation and wage assimilation of immigrants in their host country. Many studies have attempted to analyse the earnings assimilation process of immigrants and indicate that many variables affect assimilation outcomes. Self-employment is an important form of employment for immigrants, but it has not been extensively examined by previous economic studies. In Essay One I analysed the earning assimilation in New Zealand by incorporating ethnic capital effects. This essay examines the effect of "ethnic capital" (e.g. ethnic network and ethnic concentration) on immigrant choices to engage in self-employment as opposed to employment as an employee.

Self-employment provides immigrants with another niche for assimilation. There are several socio-economic factors that significantly influence immigrants' self-employment decisions. Chiswick (1978) argued that, compared with natives, immigrants are disadvantaged in the host country's labour market, because they lack English-language skills, social networks, knowledge of local customs, information about job opportunities, transferability of skill and firm-specific training. For these reasons new immigrants whose first language is different from the language of the host country face barriers to finding a job. As such, it may take a long time for their income to converge to the income level of comparable natives in the host country.

However, rather than seeking employment in the waged sector, immigrants can choose to operate their own business in order to avoid at least some of the disadvantages listed in the preceding paragraph. Thus, immigrants may be more inclined to choose self-employment. A growing number of international studies have found that there is an increasing number of immigrant entrepreneurs in countries that traditionally accept immigrants. Light and Sanchez (1987) found evidence that immigrants have been more likely than natives to be self-employed for the last one hundred years. In this paper we focus on this important but less studied form of immigrant employment.

3.1.1 Background

New Zealand has a considerable population of self-employed immigrants. The 2006 Census (Statistics New Zealand, 2007) shows that there were 492,024 residents in the workforce (15.5%)²⁰ in New Zealand that operated their own business and reported self-employment as a source of income. Around 22.3% of these (=109,893) were immigrants. It will be recalled that during the past two decades a series of reforms and adjustments has been made to New Zealand's immigration policy. In 1987, the Immigration Act 1987 replaced the preferred status of "traditional source countries" with a "stream" approach. As a result, since the 1990s, there has been an increase in the number of immigrants been engaged in entrepreneurial activities. In fact, immigrant businesses have comprised a non-negligible and lucrative part of the New Zealand economy.

²⁰ The definition of "Income Sources" (Statistics New Zealand, 2007) includes all of the people who stated each source of personal income for the 12 months ending 7 March 2006, whether as their only source of personal income or as one of several sources of personal income. Where a person reported more than one source of personal income, they have been counted in each applicable group.

Compared with other ethnic groups in New Zealand, Asian immigrants are less likely to be self-employed; only around 13% of Asian immigrants reported that they were self-employed, whereas about 22% of immigrants to New Zealand from North America were self-employed. In addition, there is evidence of conglomeration of Asian enterprises: 2006 Census data show roughly 65.4% of Asian self-employed workers were concentrated in New Zealand's core business centre – the Auckland region. That is the highest ratio among all ethnic groups. At the same time, about 10.4% of Asian self-employed workers were located in Wellington region and 8% in Canterbury region.

Economic issues

Economists hypothesise that immigrant-owned enterprises are more effective in serving the market demands of immigrants (the “protected” market). Compared with UK immigrants, Asian immigrants are disadvantaged when they try to set up businesses in New Zealand – an English-speaking country. However, “ethnic capital” provides assistance to immigrants in establishing their own business, which is particularly helpful for the low-skilled and less English-proficient Asian immigrants. As a result, low-skilled immigrants and immigrants with less proficiency in English who have located in the large ethnic enclaves are generally more likely to be self-employed. Since immigrant businesses have greater demand within the ethnic enclave, and they can create jobs, this mechanism may amplify the effect of ethnic capital. Probably, this also can explain the mechanism for the growth of the ethnic enclaves. Some of the effects of ethnic factors have been analysed in other countries such as the US and Australia (e.g. Le, 2000; Toussaint-Comeau, 2008). However, the effects of ethnic factors have still to be examined across a wider group of countries.

Data from the 2006 New Zealand Census showed that the rate of self-employment among New Zealand immigrants was around 14%; at the same time, about 17% of natives were self-employed. The rate for immigrants is lower than the rate for native-born, but these general averages do not account for factors such as age or education. This rate is in comparison higher than the rate in other countries that traditionally accept immigrants; for example, the rate of self-employment among immigrants was 10.4% in Canada and 7.3% in the US (Organisation for Economic Co-operation and Development, 2001). In addition, compared to three other countries that traditionally accept immigrants – Australia, the US and Canada – the national self-employment rate for New Zealand at 15.5%²¹ is the highest. The question of interest is why New Zealand has higher self-employment rates, both nationally and among immigrants, than the equivalent rates in other countries that traditionally accept immigrants? How does ethnic capital influence the propensity of immigrants for self-employment in New Zealand?

3.1.2 Structure of Essay Two

This chapter is arranged as follows. After the introduction, previous models and empirical results are discussed in a literature review section. Section 3.3 provides a description of “ethnic capital” and of certain hypotheses based on that concept. Section 3.4 summarizes current literatures on ethnic entrepreneurship. Section 3.5 discusses the econometric models adopted in this study. Section 3.6 describes the data set used in this paper. Empirical results and analysis are provided in Section 3.7, followed by a summary in Section 3.8.

²¹ Refers to *Birthplace by Sources of Personal Income*, 2006 Census (Statistics New Zealand, 2007).

3.2. Theoretical Framework of Ethnic Capital

The concept of ethnic capital in the context of immigration economics was first advanced by Borjas (1992). He observed that the second generation's labour market performance depends on the skill level of their father's generation and on the overall ethnic environment.

In this chapter, I adopt a wider definition, where "ethnic capital" can also refer to the ethnic concentration and network of an immigrant group. I hypothesise that immigrants can find certain helpful features awaiting them in the host country, such as an existing/established network of earlier immigrants with shared ethnicity which they can join; or a substantial number of earlier immigrants from their ethnic group who have settled in the location in which the new immigrant chooses to live. Such features are known collectively as "ethnic capital". In other words, ethnic capital is the inherent trust and advantages which stem from, and belong to, a certain ethnic group.

3.2.1 Ethnic Capital Hypotheses

Ethnic Network

Ethnic networks link immigrants and works as a platform to distribute economic resources. Immigrants may face many disadvantages, such as the lack of financial resources, or lack of information about the local market and regulations, and less proficiency in the local language.

Van Auken and Neeley (1998), Anthony (1999) and Lofstrom (2002) noted that the ethnic network helps immigrants to obtain sufficient start-up financial capital. This assistance may include matching immigrant businesses' demand for liquidity, with

financial resources from the ethnic enclave, and by providing necessary labour force and management. In addition, ethnic networks can work as an informal, instead of formal, financial sector to provide funds for immigrants (Bond & Townsend, 1996). By studying the case in the United States, they indicated that this kind of informal sector is much more efficient than the formal financial sector, and immigrant entrepreneurs prefer to seek financial resources from the informal sector in preference to the formal. For example, the informal sector lowers the costs of information, search, and monitoring for immigrants. As a result, it is expected that ethnic networks increase the propensity of immigrant entrepreneurship in the host country (e.g. Borjas, 1995; Toussaint-Comeau, 2008).

The ethnic network not only provides funds to potential immigrant entrepreneurs, but it also provides support through culture and tradition. Under well-established cultures, some ethnic groups, such as the Gujarati Indians, have a tradition of entrepreneurship (Aldrich, Jones, & McEvoy, 1984). They share the common beliefs of entrepreneurs and assist potential entrepreneurs to set up businesses through their ethnic network. In addition, the ethnic network also promotes business communication and development for immigrant-owned businesses within the ethnic enclave. In this regard, when Wilson and Martin (1980) examined the case for the United States, they found that Cuban-owned firms were most likely to have Cuban suppliers; Rajjman and Tienda (2005) found that Korean-owned and Mexican companies also preferred to do business with companies owned by other immigrants in the United States.

Ethnic enclave (ethnic concentration)

It is increasingly recognised that immigrants are potentially both complements and substitutes for each other. Complementary effect positively assists immigrants to be self-employed; while a substitution effect negatively influences immigrants' labour

market performance. As a result, immigrants benefit from concentrating geographically by ethnicity once the complementary effect dominates the substitution effect. We discuss the empirical evidence on these two opposing effects below. The question of the dominant effect remains to be an empirical question across different immigrant groups or settings.

Complementary effect

Immigration influences both the host country's labour market and the goods market (Jean & Jimenez, 2007). Immigration provides both labour supply and demand for goods and services in the host country. Because of their ethnic background, immigrants may prefer products and services which could not be satisfied by local suppliers. However, immigrants themselves can fill this gap sufficiently, and service other immigrants, probably from the same ethnic group (Waldinger, 1986). This factor is closely related to the geographical location variable, as location implies both opportunities to set up businesses, and it also reflect the size of the potential target market.

“Ethnic enclave” is often defined as the “concentration of immigrants in a residential location” (Borjas, 1986). Ethnic enclaves provide many resources for immigrants including a larger and potentially cheaper labour force, ethnic solidarity, vertical integration and a protected market (Aguilera, 2009). An ethnic enclave provides a market and it reduces the barriers to employment by establishing businesses for and by immigrants. For example, Rajman and Tienda (2003) point out that by being employed in an ethnic enclave, immigrants are offered more opportunities for training in entrepreneurship that qualify them for entrepreneurship. Most previous international studies indicated that the ethnic enclave (ethnic concentration) has positive

(complementary) effects on immigrants' self-employment decisions (e.g. Borjas, 1986; Le, 2000; Toussaint-Comeau, 2008; Wilson & Portes, 1980).

Again, the immigrant market is noted to be a “protected market”, because immigrants have a specific demand for ethnic goods and services (e.g. Aguilera, 2009; Aldrich, Cater, Jones, McEvoy, & Velleman, 1985; Aldrich & Waldinger, 1990; Boyd, 1990). This specific demand for ethnic products and services from the immigrant community increases with the size of the immigrant population of that ethnic group in a specific region. In addition, immigrant entrepreneurs are more efficient in serving this kind of ethnic-oriented demand, as they know their ethnic immigrants' preferences, demand, culture, norms, and customs better than the local businesses. Therefore, with a larger ethnic enclave, more business opportunities can be generated for potential immigrant entrepreneurs from the “protected market”. Furthermore, immigrants share social and economic capital through their network. Therefore, in this case, ethnic concentration works positively and promotes self-employment among immigrants.

Substitution effect

Some international empirical studies have observed a negative relationship between ethnic concentration and the propensity for new self-employment among immigrants (e.g. Aldrich & Waldinger, 1990; Clark & Drinkwater, 1998; Clark & Drinkwater, 2006). Aldrich and Waldinger (1990) claimed that the negative effect of the ethnic enclave on immigrants' entrepreneurship is due to the “effect of limiting entrepreneurial opportunities” and to the existence of too much competition within the ethnic enclave. In this case, the growing ethnic enclave could not generate sufficient opportunities and other socio-economic resources for promoting immigrant self-employment.

In addition, with the growth of the ethnic enclave, the immigrant market becomes a non-neglected market in the host country, leading local businesses to hire immigrants to serve and develop the immigrant market. In this scenario, there will be increased job opportunities as employees offered to immigrants in the mainstream economy, which also decreases the propensity for self-employment among immigrants. As a result, if the substitution effect with greater waged opportunities dominates the complementary effect, ethnic concentration decreases the propensity for immigrant entrepreneurship.

3.3. A Summary of Economics Theories on Immigrant Entrepreneurs

Self-employment provides immigrants with another niche for assimilation. There are several socio-economic factors that significantly influence immigrants' self-employment decisions. This section aims to explain the assumption of the effect of ethnicity (ethnic capital) on immigrants' self-employment decisions. Firstly, the definition of ethnic capital and relevant current discussions on it will be provided in section 3.3.1. Secondly, some hypotheses based on ethnic capital will be discussed in the following Section 3.3.2.

3.3.1 Effects of ethnic factors

Ethnic factors play a key role in employment decisions. Previous international studies have reviewed several aspects of ethnic capital; for example, the dual labour market, nationality, home country self-employed rate, ethnic enclaves and social

networks. Immigration influences both the host country's labour and goods markets (Jean & Jimenez, 2007).

Immigration provides both labour supply and demand for goods and services in the host country. Because of their ethnic background, immigrants may have preferred products and services which could not be satisfied by local suppliers. However, immigrants themselves can fill this gap sufficiently, and service other immigrants, probably from the same ethnic group (Waldinger, 1986). In addition, this factor is highly related with the geographical location variable, as location implies opportunities to set up businesses and the size of the potential target market.

Previous literature observed a positive relationship between the home-country self-employed rate and an immigrant's tendency to be self-employed. Hammarstedt and Shukur (2009) claimed that high self-employed rates among immigrants in the host country often relate to a high self-employment rate in their home country, and experience of self-employment is a "sector-specific human capital", such that this group of immigrants may be more efficient in the self-employed sector. Yuengert (1995) built an individual-level self-employed equation that included a variable for the immigrant's home country self-employed rate and found support for the home country self-employed hypothesis. Previous studies support the hypothesis that the higher the self-employed rate in the home country, the higher the propensity for an immigrant from that country to be self-employed in the host country. In addition, from this point of view, economists recognise that immigrants from a different culture, country of origin and birthplace may be expected to have a different propensity for self-employment.

The concept of an ethnic enclave is referred to most frequently for explaining the propensity for self-employment. "Ethnic enclave" is often defined as the "concentration

of immigrants in a residential location” (Borjas, 1986). Ethnic enclaves provide many resources for immigrants: a cheap labour force, ethnic solidarity, vertical integration and a protected market (Aguilera, 2009). In addition, an ethnic enclave provides a market and it reduces the barriers to employment for immigrants. Raijman and Tienda (2003) pointed out that by being employed in an ethnic enclave, immigrants are offered more opportunities for training that qualify them for entrepreneurship. While an ethnic enclave provides such a “protected market” for potential immigrant entrepreneurs (e.g. Aguilera, 2009; Aldrich & Waldinger, 1990), ethnic networks “play a role in mobilizing monetary and information resources for small business” (Toussaint-Comeau, 2008).

Also notably, it is argued that ethnic networks significantly assist in matching immigrant businesses’ demand for liquidity by providing financial resources from the ethnic enclave (Anthony, 1999). For example, it is observed that immigrant entrepreneurs prefer to seek financial resources from the informal sector in preference to the formal sector in Chicago (Bond & Townsend, 1996). As a result, there is supporting evidence that ethnic networks increase the propensity of immigrant entrepreneurship in the host country (e.g. Borjas, 1995; Toussaint-Comeau, 2008).

3.3.2 Other Hypotheses

Economists and sociologists have observed about six key determinants of immigrant entrepreneurship (refer to Evans, 1989; Kidd, 1993; Le, 2000): educational attainment, labour market experience, economic requirements, marital status, industry and occupation factors, and the host country’s language and ethnicity factors.

In the literature on self-employment, educational attainment is noted to have a significant influence resulting from two opposing forces (e.g. Le, 2000). On the one hand, educational attainment reflects the ability of the individual, in particular, his or her managerial ability, to operate a business. On the other hand, individuals with higher educational attainment are less likely to be self-employed, since education enhances the propensity for a person to find employment in the waged sector. Therefore, the dominant impact is an empirical question.

Experience is argued to be either a “stock” (Evans, 1989) or “flow” (Kidd, 1993). In addition, labour market experience can be viewed as the accumulation of skills and market information. With greater experience, an individual will be more confident about operating a business. Secondly, age increases at the same time as an individual’s labour market experience increases. With the increase in age, personal learning capacity and the present value of future returns diminishes, so increasing age also decreases the propensity for self-employment.

Previous studies (e.g. Bernhardt, 1994; Kidd, 1993) have paid attention to the importance of economic requirements for entrepreneurship decision. For example, Kidd (1993) used age as a proxy for financial capital and adopted a binary variable, “rent”, to study immigrants’ propensity for self-employment. Kidd concluded that those who own their residence are more likely to select self-employment than those who rent a house.

Marital status is an indicator of stability, which thus provides implications for and background to a risky self- employed status. Borjas (1986) noted that married individuals are more likely to choose self-employment because married couples may like to “put up” or join financial resources to run their business. In addition, given family

support, it would also reduce the unwillingness to take risks that an individual might face. As a result, marriage makes self-employment more feasible for an individual.

Since the first wave of the Longitudinal Immigrant Survey: New Zealand (LisNZ) data²² was conducted six months after new immigrants settled in New Zealand, the variables such as proficiency in English, children, marriage, skill level, overseas self-employment experience and own dwelling in our model are treated as exogenous variables, as by design we incorporate we tested only the first wave's data for those variables.

It is also hypothesised that self-employment is partially affected by occupational status. According to the Middleman Minority Theory, the employment status of an individual is decided by the work undertaken (Bonacich & Modell, 1980). Current employment provides work experience and training for potential entrepreneurs before they set up their own business. This is also a complementary explanation for the impact of experience, as more information about the market, business networks and business skills will be acquired during that period. Evans (1989) observed that individuals with a high occupational status are more likely to choose self-employment. More specifically, Le (2000) claimed that trade, sales, and managerial occupations require more relevant knowledge, and they also make self-employment more feasible.

The effect of skill in the host country's language is significant and unambiguous. Host country's language proficiency (e.g. English) reflects the immigrant's integration into the general community. However, the effect of English-language skills in relation to self-employment is ambiguous, and it may vary by country, data, and cohort. On the one hand, a lack of skill in the host country's language will hinder business communication

²² More details about the LisNZ data will be provided in section 3.6.1.

with the native mainstream economy (e.g. Le, 2000). On the other hand, a lack of English proficiency can increase the propensity for self-employment by satisfying the demand from other immigrants from the same ethnic group (e.g. Evans, 1989). In addition, a third point of view is based on Disadvantage Theory (Light, 1979): communication disadvantages make it difficult for immigrants to be employed in the wage sector; however, the same disadvantages encourage them to be self-employed.

Previous New Zealand studies (e.g. Maré & Stillman, 2009; Poot, 1998) have analysed the effect of human capital and personal characteristics on immigrants' labour market performance. However, the effect of ethnic capital (e.g. ethnic network and ethnic concentration) on immigrants' economic performance (especially self-employment outcome) in this context remains unknown.

In this essay I account for these factors in addition to our new network variable of interest.

3.4. Review of Econometric Frameworks

In this section, empirical models used to test the effects of human capital will be discussed first. The following section discusses the econometric models involved in examining the effects of ethnic capital factors, such as ethnic enclave and ethnic networks, on the propensity of immigrants' self-employment.

3.4.1 Human Capitals and Self-employment

The propensity of self-employment for immigrants varies across different arrival times. In order to trace the cohort effect with the absence of longitudinal data, Borjas (1986) structured an econometric model, which is able to observe the “within-cohort effect” and “cross-cohort effect”.

In this conventional model, where making a self-employment decision, immigrant i selects self-employment if the expected utility of self-employment is not less than its opportunity cost (the market wage/salary that the individual could earn). Thus, the index function is:

$$I_i = y_i - w_i = X_i\pi + v_i \quad (34)$$

where I_i is an index function, y_i is the expected income from self-employment, and w_i is the expected income as a salaried worker; X_i is a vector of observable socio-economic variables such as education, marital status, and experience, etc.; in addition, these socio-economic variables influence the individual's labour market outcomes y_i and w_i . Once I_i is positive, then that immigrant definitely chooses to be self-employed rather than employed in the wage and salary sector. Therefore, the propensity of self-employment for individual i is:

$$P_i = Pr[I_i > 0] = Pr[v_i > -X_i\pi] \quad (35)$$

In the above probability function, parameter vector π can be estimated when the stochastic nature of error term v_i is specified.

Borjas had created a synthetic panel to identify successive cohorts of immigrants. Immigrants who were aged 18-54 in the data were divided into four cohorts in the 1970 US Census data: arrivals in 1965-1969, arrivals in 1960-1964, arrivals in 1950-1959, and immigrants arrived before 1950. He also classified six immigrant cohorts based on the 1980 Census: arrivals in 1975-1979, arrivals in 1970-1974, arrivals in 1965-1969, arrivals in 1960-1964, arrivals in 1950-1959, and immigrants who have arrived before 1950. The last four immigrant cohorts classified in the 1980 Census have the same definitions as the cohorts from the 1970 Census. As a result, the disturbance v_i can be assumed to be logistically distributed and the maximum likelihood estimation is unbiased:

$$\ln\left(\frac{P_{70}}{1-P_{70}}\right) = X\gamma_{70} + \alpha_{65}D_{65} + \alpha_{60}D_{60} + \alpha_{50}D_{50} + \alpha_{40}D_{40} + \eta_{70} \quad (36)$$

$$\ln\left(\frac{P_{80}}{1-P_{80}}\right) = X\gamma_{80} + \alpha_{75}D_{75} + \alpha_{70}D_{70} + \alpha_{65}D_{65} + \alpha_{60}D_{60} + \alpha_{50}D_{50} + \alpha_{40}D_{40} + \eta_{80} \quad (37)$$

where P_t represents the propensity of self-employment in census year t , D is the cohort dummy, and X is a vector of socio-economic characteristics. In addition, due to the definition, the vector X in (36) and (37) does not contain a constant term.

This results in the following probabilities:

$$\hat{P}_{70,k} = \frac{1}{1+\exp[-(X\gamma_{70}+\hat{\alpha}_k)]} \quad (38)$$

$$\hat{P}_{80,k} = \frac{1}{1 + \exp[-(\bar{X}\hat{\gamma}_{80} + \hat{\alpha}_k)]} \quad (39)$$

$$\hat{P}_{80,k+10} = \frac{1}{1 + \exp[-(\bar{X}\hat{\gamma}_{80} + \hat{\alpha}_{k+10})]} \quad (40)$$

where \bar{X} is the mean of socio-economic variables for immigrants, k is the cohort index; e.g. $D_k = 1$ ($k = 40, 50, 60, 65$). Therefore, equation (38) and (39) estimate the propensity of self-employment for a member of cohort k in the 1970 and 1980 Census respectively. Equation (40) gives the probability of self-employment for the cohort who that arrived ten years after cohort k as observed in 1980 US Census. Thus, cohort k in 1970 and cohort $k+10$ in 1980 have the same immigration history.

Therefore, we are able to define the cross-section change in propensity ($\hat{P}_{80,k} - \hat{P}_{80,k+10}$):

$$\hat{P}_{80,k} - \hat{P}_{80,k+10} = [(\hat{P}_{80,k} - \hat{P}_{70,k}) - (\hat{P}_{70,k} - \hat{P}_{80,k+10})] \quad (41)$$

In the above equation, the first part shows the “within-cohort” effect. This is the change in the self-employment propensities for the same cohort in the data from the two censuses. The second part represents “across-cohort” effect that predicts the change in the probabilities of self-employment for two cohorts with the same years since migration in two censuses.

It is noteworthy that the first part of equation (41) also could be a biased measurement of the effect of assimilation because of the sufficient change in labour market conditions between 1970 and 1980. Borjas claimed that this problem can be solved by netting the changes of the propensities of self-employment for natives in equation (41).

Suppose the logit model predicting the propensities of self-employment for natives are:

$$\ln\left(\frac{P_{70}}{1-P_{70}}\right) = X\delta_{70} + \alpha_n + u_{70} \quad (42)$$

$$\ln\left(\frac{P_{80}}{1-P_{80}}\right) = X\delta_{80} + \beta_n + u_{70} \quad (43)$$

where “ n ” indicates that the individual is native born. The self-employment probabilities for native born are:

$$\hat{P}_{70,n} = \frac{1}{1+\exp[-(\bar{X}\hat{\delta}_{70}+\hat{\alpha}_n)]} \quad (44)$$

$$\hat{P}_{80,n} = \frac{1}{1+\exp[-(\bar{X}\hat{\delta}_{80}+\hat{\beta}_n)]} \quad (45)$$

As a result, I can rewrite equation (41) by adding the part of natives’ performance and have an unbiased estimation:

$$\hat{P}_{80,k} - \hat{P}_{80,k+10} = [(\hat{P}_{80,k} - \hat{P}_{70,k}) - (\hat{P}_{80,n} - \hat{P}_{70,n})] + [(\hat{P}_{70,k} - \hat{P}_{80,k+10}) - (\hat{P}_{70,n} - \hat{P}_{80,n})] \quad (46)$$

The first part (bracketed term) in equation (46) estimates the differences of the “within-cohort” effects between natives and immigrants based on the two censuses’ years’ data. The second part shows the “across-cohort” effect, net the “economy-wide changes experienced by the native-born during the 1970-1980 period”. By doing so, Borjas observed a significant cohort effect on immigrants’ self-employment decision.

Recent immigrant cohorts have higher propensities to be self-employed than earlier cohorts in the US. In addition, by comparing the probabilities of self-employment for natives, he found that immigrants were more likely to be self-employed than the comparable natives.

3.4.2 Effects of Country of Origin

Lofstrom (2002) provided a probit model to examine the effect of country of origin and English language on immigrant self-employment. In Lofstrom's model, the immigrant has two employment choices, either the wage/salary sector or self-employment. The decision is made based on the highest utility that the option can provide. He assumed that the utility function is a function of expected earnings and the characteristics of work z_i in the two sectors. So, y_i^s denotes the income from self-employment for immigrant I , and y_i^w is the income from the wage/salary sector. Earnings in each sector depend on the observable characteristics X_i and unobservable characteristics ε_i .

As a result, the utility for to be self-employed will be:

$$E(u_i^s) = z_i^s \lambda^s + y_i^s = z_i^s \lambda^s + X_i \beta^s + \varepsilon_i^s \quad (47)$$

The utility from the wage/salary sector is:

$$E(u_i^w) = z_i^w \lambda^w + y_i^w = z_i^w \lambda^w + X_i \beta^w + \varepsilon_i^w \quad (48)$$

where ε_i^s and ε_i^w are jointly normally distributed with zero mean and variances σ_w^2 and σ_s^2 .

Assuming that immigrant i maximises his/her utility; the immigrant will choose to work in the self-employment sector if:

$$I_i^* = E(u_i^s) - E(u_i^w) > 0 \quad (49)$$

Because the index function I_i^* is unobservable; from equations (47), (48) and (49) we can define I_i^* as:

$$I_i^* = E(u_i^s) - E(u_i^w) = (X_i\beta^s - X_i\beta^w) + (z_i^s\lambda^s - z_i^s\lambda^w) + (\varepsilon_i^s - \varepsilon_i^s) = W_i\pi + e_i \quad (50)$$

We can estimate the observed choices I_i on: $I_i = W_i\pi + e_i$

Therefore, we can set $I=1$ if $I_i^* > 0$ that is the immigrant chooses to be self-employed; otherwise, $I_i^* \leq 0$ if the wage/salary sector has been chosen. Now, equation (50) can be seen as a probit model of sectoral choice of self-employment.

Lofstrom claimed that estimating the self-employment choice in equation (50) by a probit model has two benefits: (1) It will provide insight into the role of different characteristics in choosing a sector. The question can be explained via this process: What are the reasons for the differences in self-employment rate between immigrants and natives and what is the role of the factors? (2) From the probit estimates, when the instruments z_i are included in the model, the inverse Mills ratio can be calculated. This will help to correct for self-selection problems in the earnings functions through a use of the Heckman two-step procedure.

Finally, the probability of an immigrant to choose work in the self-employment sector will be:

$$Prob[I_i = 1] = \phi(W_\pi) \quad (51)$$

where $\phi(.)$ is the standard normal cumulative density function.

In addition, one of Lofstrom's detailed models to explain the effect of ethnic concentration on immigrant's self-employment decision is:

$$\begin{aligned} Prob[I_i = 1|W_\pi] = & \beta_0 + Immigrant_i\beta_1 + Country_i\beta_2 + Age_i\beta_3 + Age_i^2\beta_4 + \\ & \frac{Age_i^3}{1000}\beta_5 + English_i\beta_6 + YSM_i\beta_7 + YSM_i^2\beta_8 + \frac{YSM_i^3}{1000}\beta_9 + Year\ of\ Schooling_i\beta_{10} + \\ & Year\ of\ Schooling_i * Immigrant_i\beta_{10} + Age_i * Immigrant_i\beta_{11} + Age_i^2 * \\ & Immigrant_i\beta_{12} + \frac{Age_i^3}{1000} * Immigrant_i\beta_{13} + C_i\beta_{14} + E_i\beta_{15} + e_i \end{aligned} \quad (52)$$

Immigrant is a binary variable that denotes whether individual *i* is an immigrant or not; *Country* is a vector of country dummies; *English* is the binary variable for showing whether an individual's English language proficiency; *YSM* stands for the years since migration; *C* is a vector of arrival time dummy variables; and *E* refers to the proportion of immigrants from the same country in the Standard Metropolitan Statistical Area (SMSA).

By incorporating 1980 and 1990 US Census data, Lofstrom found that immigrants have a higher propensity of self-employment than natives in the US. The self-employment rates for immigrants vary across different ethnic groups and arrival cohorts. Immigrants from South East Asia, South and Central America and the Caribbean are less likely to be self-employed than natives; immigrants from Europe and the three English-speaking countries of Canada, Australia and New Zealand have higher

probability of self-employment than native-born in the US. Furthermore, North East Asian immigrants have the highest propensity of self-employment among all ethnic groups.

Self-employed immigrants tend to have higher educational attainment and greater English proficiency than other immigrants who were employed in the wage/salary sector. In addition, education has a stronger effect on natives' self-employment choice than it does for immigrants'. Furthermore, by testing the proportion of co-nationals in the same region, Borjas' (1986) finding of ethnic enclave effects has been confirmed by this model. Thus, Lofstrom concluded that the proportion of co-nationals will positively promote immigrant entrepreneurship in a specific region in the US; and that also is the explanation for some of the differences in the propensities of self-employment between immigrants and natives.

3.4.3 Effects of Ethnic Enclave

The economics literature has provided limited analysis of the mechanism through where the ethnic enclave enhances the self-employment choice of immigrants. Borjas (1986) found the immigrants' probability of self-employment always exceeds the same probability for native-born in the US across all ethnic groups. He was not satisfied with the explanation of the hypothesis that immigrants gain higher income from self-employment than native-born. He concluded instead that this explanation does not show a clear understanding of the reason why the nativity differences arise.

The extensive sociological literature has, however, shed light on this point (e.g. Portes & Jensen, 1989). The sociological literature emphasises that by concentrating geographically, immigrants create enclaves and enhance their comparative advantage in

serving the demands of specific ethnic goods from their ethnic group. Thus, the ethnic enclave raises the propensity of self-employment for immigrants.

According to the cultural and language similarities for three Hispanic groups (Mexicans, Cubans, and other Hispanics), Borjas argued that Hispanic enclaves definitely help the Hispanic immigrant entrepreneurs.

The logit estimation of the effect of ethnic enclave is (Borjas, 1986):

$$\ln\left(\frac{P}{1-P}\right) = Z\gamma + \lambda q_h + v_i \quad (53)$$

where Z is a vector of socio-economic variables, q_h is the proportion of Hispanic population of the MSA's²³ population. Due to the hypothesis of ethnic enclave, we would expect that the coefficient of the immigrant population size in a specific region λ should be positive. In addition, if we estimated equation (53) separately for immigrants and natives, the impact of q_h is expected to be larger in the immigrants' case than in the natives' sample.

Borjas had examined the effect of ethnic enclave on the propensities of self-employment of three Hispanic groups by 1970 and 1980 US Census data. He found that the ethnic enclave increases the self-employment rate of Mexican immigrants by 1.2%. Similar effects also have been observed for Cuban and other Hispanic immigrants in the US.

Furthermore, ethnic enclave was defined in various forms as a result of the analysis design across entrepreneurship studies. For example, instead of defining ethnic enclave by the proportion of immigrants' population size, Portes and Jensen (1989)

²³ Metropolitan Statistical Area.

defined ethnic enclave as the geographic concentration of business owned and operated by the ethnic group. In most cases, the region is considered as an ethnic enclave for a specific ethnic group. Many researches have adopted this approach and had labelled the cities or regions as ethnic enclaves for specific ethnic groups (e.g. Sanders & Nee, 1992; Zhou & Logan, 1989).

Aguilera (2009) argued that this approach provides “structural advantages” as it allows “owners, suppliers and workers to share an ethnicity”; at the same time “it is difficult to interpret the threshold of an ethnic enclave” and “making it difficult to reproduce these studies”. Thus, Aguilera (2009) employed the percentage of ethnic self-employment rate in the specific region as a proxy of the size of ethnic enclave. He found that the ethnic self-employment ratio has a negative effect on the propensity of self-employment for Cuban and Mexican immigrants. He further found that self-employed Cubans in Florida, and self-employed Mexicans in Texas and California could not gain any advantage from large ethnic enclaves.

3.4.4 Effects of Ethnic Network

Bertrand, et al. (2000) studied the network effects and social welfare in the US. In their research, they claimed language as a better measure of social linkage as it indicates the “quantity” of the network. Furthermore, the “quality” of the network for an individual is measured by the population size of those using welfare and the same language. Toussaint-Comeau (2008) applied the same approach as Bertrand et al., (2000) in the research on immigrants’ self-employment decisions. She defined the network as follows:

$$Network_{jk} \approx E_{jk} \times Q_{jk} \quad (54)$$

where

$$E_{jk} = \frac{\textit{The proportion of people from } k^{th} \textit{ group in region } j}{\textit{The proportion of people from } k^{th} \textit{ group of the total population}} \quad (55)$$

Q_{jk} = Average self employment rate of group k – National level

As a result, Toussaint-Comeau (2008) observed a positive effect of social network on the propensity of self-employment for immigrants in the US. However, the empirical evidence could not support the hypothesis of ethnic concentration on the probability of self-employment.

Another study is provided by Borjas (1995b). Bertrand et al., (2000) and Toussaint-Comeau (2008) argued that the variable of ethnic capital in Borjas' (1995) study actually can also be a proxy for "network" effects based on ethnic similarity. This proxy for network is measured by "average quality" of the ethnic group to which that immigrant belongs. As such every immigrant from the same ethnic group and region takes the same value for that variable. Finally, Borjas (1995) observed a positive impact of ethnic capital (network effect) on immigrants' next generations' skill and assimilation process.

3.5. Models

In order to explore the effects of ethnic network, previous empirical studies have adopted either ethnic concentration (e.g. Aguilera, 2009; Andersson & Hammarstedt, 2011; Damm, 2009; Edin et al., 2003) or linguistic concentration (Bertrand et al., 2000) as the proxy for ethnic network. Unlike these studies, I adopt the “spatial approach” to account for ethnic networks, and ethnic concentration. This modelling approach captures the effects of the strength of social and resource networks for immigrant groups. I add a weighted ethnic-spatial lag variable and compare this to the conventional model. In this section, a conventional model which investigates the effect of personal characteristics on immigrants’ self-employment decisions will be considered first. Following that, the new model with a spatial approach, which can investigate the effect of ethnic capital, is introduced.

3.5.1 Previous Models

Previous international studies explored the effects of human capital and social capital (e.g. ethnic enclave) on the individual’s self-employment decisions. These models have general adopted the general form as follows (e.g. Le, 2000):

$$\log\left(\frac{S.E.j}{1-S.E.j}\right) = X_j\beta \quad (56)$$

Using the logit model, the natural log of the odds ratio of self-employment to wage/salary sector employment is explained by a linear function of human and social capitals X_j .

3.5.2 Ethnic-Spatial Approach

Previous international studies adopt either ethnic concentration or language as a proxy of immigrants' network in the host country (e.g. Chiswick & Miller, 1996). In contrast to these studies, I adopt the "ethnic spatial network approach" to account for ethnic concentration and networks in order to capture the effects of social and resource networks for immigrant groups. I incorporate different measures of ethnic capital, in particular, ethnic group economic resources and spatial-ethnic concentration. The details of the basic setting of the spatial model adopted in this chapter are provided in section 2.4.2.

This is the first trial of the ethnic spatial network approach on self-employment choices. The ethnic spatial matrix is constructed with micro data, based on the three conditions of 1) ethnic group, 2) region of residence, and 3) year of survey. This specification allows us to better understand the migrants' network effect through the data.

The spatial model provides a realistic theoretical framework and an improved empirical framework to investigate the effect of ethnic capital. Under the ethnic-capital hypothesis, individuals' self-employment decisions depend on ethnic capital and other socio-economic variables. In this setting, one can define individuals who are from the same ethnic group and location as the first-order "ethnic neighbours". Thus, "ethnic-spatial dependence" represents the case that an individual's self-employment decision is influenced by the ethnic neighbours' labour market performance and other ethnic-capital factors in that location.

3.5.3 Conditional Spatially Autoregressive Self-employment Decision Model

Following on from the hypotheses of ethnic capital and the analysis in Essay One, I investigate how the ethnic network influences immigrants' self-employment decisions. The logit model is widely employed in testing such discrete choices (to be self-employed or not), as it approaches the random utility assumption to the self-employment decisions. In this study, I have adopted similar settings for a binary weighted spatial-lag model as those of Adjemian, Lin and Williams (2010).²⁴

Immigrant i chooses a form of employment (either to be self-employed (S.E.) or employed in the wage/salary (W.S.) sector) which will maximise his/her utility. For the self-employment choice (S.E.) the utility for a recent male immigrant is given by:

$$U_i^{S.E.} = V_i^{S.E.} + \varepsilon_i^{S.E.} \quad (57)$$

where $V_i^{S.E.}$ shows the deterministic portion of utility, $\varepsilon_i^{S.E.}$ represents a random component. Then, the deterministic utility is composed of a set of explanatory variables and a weighted ethnic-spatial lag (which represents social network effect):

$$V_i^{S.E.} = \beta' x_i + \rho W f(V_i^{S.E.}) \quad (58)$$

where x_i is a set of social-economic variables for immigrant i , such as educational attainment, years since migration, age, and other demographic variables and local characteristics; and W is the spatial-weight matrix which indicates the first-order ethnic neighbourhood for every immigrant.²⁵ As a result, the coefficient of W indicates

²⁴ More details about the basic setting of ethnic spatial network model are provided in the model section in Essay One.

²⁵ More details about the ethnic spatial matrix are provided in the model section in Essay One.

the correlation of utility from choosing self-employment for all immigrants who are members of a particular ethnic network.

The immigrant makes a decision regarding which sector to be employed in: the self-employment (*S.E.*) sector or wage/salary (*W.S.*) sector. As a result, the decision rule for immigrant *i* is expressed as:

$$\begin{aligned}
 Pr[y = S.E.] &= Pr[U_i^{S.E.} > U_i^{W.S.}] \\
 &= Pr[U_i^{W.S.} - U_i^{S.E.} < 0] \\
 &= Pr[V_i^{W.S.} + \varepsilon_i^{W.S.} - V_i^{S.E.} - \varepsilon_i^{S.E.} < 0] \\
 &= \int I(\varepsilon_i^{W.S.} - \varepsilon_i^{S.E.} < V_i^{S.E.} - V_i^{W.S.}) f(\varepsilon_i^{W.S.}) d\varepsilon_i^{W.S.} \tag{59}
 \end{aligned}$$

where the indicator function *I* takes the value of one if the expression in parentheses is true, otherwise it is equal to zero. In addition, the independent random error assumption is held, and ε is identically Bernoulli distributed²⁶ for all immigrants (see Adjemian et al., 2010). Therefore, the probability of immigrant *i* deciding to choose self-employment (*S.E.*) is given by the logistic probability:

$$P_i^{S.E.} = \frac{1}{1 + \exp(V_i^{S.E.})} \tag{60}$$

²⁶ It is a discrete probability distribution: it is equal to 1 with success probability *p*, and equal to 0 with failure probability.

3.5.4 Estimation Issues

Previous studies emphasise the notion that in the spatial discrete choice models, the network effect is treated as a signal or a kind of knowledge (e.g. Goetzke, 2008), which means that the spatial spillover could be unidirectional but not multidirectional (e.g. Adjemian et al., 2010). For example, we can suppose that every immigrant only makes one choice per round (e.g. a specific year); once immigrant i makes a choice on self-employment, immigrant k learns about this information and take this knowledge as one of the factors to assist him to make a decision whether or not to be an immigrant entrepreneur. However, immigrant k 's decision is not going to influence immigrant i 's decision again at the same round.

Under this assumption, there will be no spatial autocorrelation assumed in the error term, and the spatial-lag term (ethnic network in this study) is assumed to be an exogenous variable. Therefore, under such setting, this model is conditional upon the observed neighbouring location choices, and the spatial choices' correlation is not modelled as an endogenous variable. Anselin (2002) named this model, the conditional spatially autoregressive discrete choice model. In addition, one of the advantages of this setting is that it simplifies the computation processes and makes the estimation for a large weight matrix possible by employing the maximum likelihood estimator.

3.6. Data

In this section, the three-year longitudinal New Zealand dataset will be introduced: the Longitudinal Immigrant Survey: New Zealand (LisNZ). The following section provides sample summaries for LisNZ.

3.6.1 Longitudinal Immigrant Survey: New Zealand (LisNZ)

The LisNZ project was proposed as a result of concerns in the early to mid-1990s about the lack of information to help in facilitating positive settlement for immigrants and difficulties in accessing information about the impacts of immigration on the New Zealand labour market. One of the very important features of longitudinal surveys is that they are designed and used to collect information from a sample of migrants on several occasions, thus capturing an understanding of the complete dynamics of the migration and settlement processes. Furthermore, it allows an econometric control for unobserved time-invariant individual specific factors.

The LisNZ data is an important component of this research, with specific advantages unique to this data. The most important feature of LisNZ is that it is longitudinal, with data on a large sample based on consecutive surveys of the same group of new immigrants in New Zealand for three years. Therefore, the methodology and the data allow the researcher to track the dynamics of new immigrants' location choices in New Zealand. This feature of the data is expected to provide more reliable analysis of the effect of ethnic capital on location choices and the assimilation effect on immigrants than was previously possible.

Among the advantages of this type of dataset is that it eliminates measurement error or biases in results. In addition, there are rich personal and destination characteristics available in the LisNZ dataset, which allows controlling for personal characteristics, family and skill. In addition, LisNZ provides additional variables that are not included in other datasets and that are very helpful in explaining immigrants' location choices in New Zealand, such as education gained in New Zealand, labour market experience gained both from overseas and New Zealand, financial assets, how many years an immigrant intends to live in New Zealand, and factors which help them to get jobs. The data set also provides comprehensive information on a range of variables including language proficiency of each immigrant. The LisNZ survey includes a question regarding whether or not interviewees are self-employed. I have defined individuals as such where they have answered, "Yes".

The LisNZ project includes three interviews (which are also referred to as "waves") with the same group of selected immigrants. The first wave (wave 1) interviews are conducted six months after new immigrants settle in New Zealand. The second wave (wave 2) is conducted 12 months after the wave 1 survey. The last survey (wave 3) is conducted in the 36th month after the immigrants have settled in New Zealand. The wave 1 interview was conducted between 1st May 2005 and 30th April 2007. The wave 2 interview was conducted from June 2006 to March 2008. The wave 3 interview was completed by November 2009. The results of all three waves' interviews have been published.

The full survey aimed to achieve about 5,000 completed interviews at wave 3, allowing for non-response and attrition. All immigrants (except refugees) more than 15 years old who were approved for permanent residence in New Zealand are included in the

target population for LisNZ. Immigrants were sampled at the time they were granted residence. Immigrants who are approved offshore have 12 months from the date their residence is approved to arrive in New Zealand and take up residence. The population includes immigrants who were approved for residence both offshore and onshore. The number of respondents interviewed (both onshore and offshore applicants) for wave 1 totalled 7,137. The survey sample was selected from migrants aged 16 years and over who were approved for permanent residence in New Zealand from 1 November 2004 to 31 October 2005.

In addition, like the New Zealand Census, LisNZ classifies New Zealand into 16 regions (at regional council level)²⁷. Therefore, specific hypotheses across regions can be identified in this study, including the hypothesis that Auckland is a major immigration region. In addition, like the New Zealand census, LisNZ classifies New Zealand into sixteen regions at regional council level. These regions are generally similar to the size of US MSAs in terms of population and geographic spread. The majority of American studies (e.g. Yuengert, 1995) have examined immigrants' geographical decisions in the light of MSAs. I would argue that New Zealand's 'regions', as generally organised around a major city, are quite equivalent, in terms of size. Given that this essay emphasises the impact of ethnicity and location on employment levels, it follows that I consider immigrants' self-employment decisions at the New Zealand regional level. As such, immigrants living in one suburb of a region are able to access knowledge/information, indirectly, regarding self-employment in other suburbs of that region, and a network is likely to develop within that region. For example, Immigrant A, located in a northern suburb has a friend, Immigrant B, located in the central suburb, connected to a third

²⁷ New Zealand regions are: Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Taranaki, Manawatu-Wanganui, Wellington, West Coast, Canterbury, Otago, Southland, Tasman, Nelson, and Marlborough.

friend, Immigrant C, residing in a southern suburb. Therefore, Immigrant A may obtain information about self-employment opportunities in the southern suburb through the network. Studies with big data, i.e. from Facebook may allow explicit tests by this. Taking into account this information, and adopting the ethnic-spatial weighted matrix, I aim to capture the impact of an entire network on a particular location. Another relevant scenario is that immigrants might cluster in one region, but be self-employed elsewhere. For example, some immigrants may live in one suburb, yet work in another suburb. Therefore, I think in considering their locations, the regional perspective helps to best address this in this setting.

LisNZ also provides detailed information on country of origin. As a result, it is possible to analyse specific ethnic group effects on ethnic capital. It also allows for the consideration of the specific effects for immigrants from different regions of Asia, and allows comparison with other groups of immigrants (in particular, immigrants from the UK and Ireland).²⁸

²⁸ According to the 2006 New Zealand Census (Statistics New Zealand, 2006), China has become the second largest immigrant source country for New Zealand (after the UK and Ireland). In the analyses I consider the major ethnic groups from the UK and Ireland, China, India, the Pacific Islands, and the rest of the world.

Table 12: Definition and Variable List

Human Capital	
Labour Market Experience (Experience)	This is a derived variable which is equal to an individual's current age minus the age of graduation.
Proficiency in English*	Binary variable=1 proficient in English (self-reported).
Overseas Self-employment Experience	This variable represents the years of overseas self-employment experience of immigrants.
High Skilled*	Binary variable=1 if that individual's highest education attainment is Bachelor or higher.
Personal Characteristics	
Years Since Migration (YSM)	This variable represents the duration of immigration.
Married*	Binary variable=1 if married.
Children*	Binary variable=1 if has children.
Own Dwelling*	Binary variable=1 if owns house/flat.
Manager & Professional*	Binary variable=1 if occupation is manager or professional.
Ethnic Capital	
Ethnic Network	The weighted ethnic spatial lag (W_y . Refer to Section 3.1.2).
Ethnic Concentration	The lag of proportion of the population of a specific ethnic group to the total population size in a specific region (EC_{it} . Refer to Section 3.6.2)

Note: * These variables are based on the first wave data.

3.6.2 1996 and 2001 New Zealand Census

One of the ethnic capital variables (ethnic concentration) that are derived from the published 1996 and 2001 New Zealand Census tables is explained below. This ethnic capital variable, which is measured at the New Zealand regional level (which is also consistent with the location information reported by LisNZ) incorporates LisNZ data to examine immigrants' assimilation effect in New Zealand.

In this thesis, I adopt a similar approach to Borjas (1986) with:

$$ethcon_{ij} = \frac{Population_{ij}}{Population_j} \quad (61)$$

where “*i*” denotes ethnic group, and “*j*” represents a specific region in New Zealand. The numbers of people who usually reside in a locality are reported by gender and country of origin in both the 1996 and 2001 published census tables. Due to the hypothesis of ethnic enclave, we would expect that the coefficient of the immigrant population size in a specific region should be positive in most cases.²⁹

3.6.3 Demographic Characteristics

As a result of a series of immigration policy adjustments during the past two decades in New Zealand, the structure of the immigrant population in New Zealand has been profoundly changed in many aspects, such as country of origin, degree of language skill, and education level. In this section, immigrants are examined by their ethnic groups in order to show the differences in the characteristics of immigrants of different ethnic backgrounds.

²⁹ Since I use the lagged value of ethnic concentration in this study, the lagged ethnic concentration variable is treated as an exogenous variable here.

Table 13: Descriptive Statistics of Employed Male Immigrants in New Zealand, Age 20-55, by Country of Origin, LisNZ (Wave1-3)

	Foreign-Born	UK & Ireland	Asia
Age (Mean)	36.1	38.4	34.2
Years Since Migration (Mean)	6.5	6.7	6.3
Experience (Mean)	15.9	18.0	13.4
Currently Married	47%	46%	45%
Proficiency in English	90%	100%	82%
High skilled	33%	35%	50%
Has Own House/Flat	28%	55%	19%
Has Kids	38%	39%	16%
Self-Employed	12%	13%	7%
Manager and Professional	55%	65%	57%
Number of Observations	6735	1587	2512

Note: According to Statistics New Zealand Data-Lab Output requirements, unweighted counts produced from LisNZ data need to be rounded to the nearest 5.

In this study, we have selected employed male immigrants aged between 20 and 55 years old. We have dropped some observations due to missing data issues; the total sample size is 6,735. The data set reflects a diverse group of immigrants in our sample. There are 1,587 observations contributed for immigrants from the United Kingdom and Ireland; and 2,512 from Asian countries.

The average age of recently approved permanent residents from the United Kingdom and Ireland is the oldest among all five ethnic groups (38.45 years old) and is also higher than the sample average (36.11 years old). Recently approved permanent residents from Asia are generally the younger than UK and Irish immigrants, with an average age of 34.2 years.

Although the recent Asian immigrants have a lower average age, they also tend to have a lower number of New Zealand (living) experiences (years since migration-YSM). The mean “potential years since migration” for them is around 6.3 years, which is lower than the same figure for the sample average and immigrants from the UK and Ireland. In addition, the same figure for immigrants from the UK and Ireland is relatively high at about 6.7 years. Therefore, in this sample, age and New Zealand experiences are positively correlated.

Immigrants from the United Kingdom tend to have more experience in the labour market (18.0 years) than immigrants from other ethnic groups. Asian immigrants (13.4) to New Zealand have significantly fewer labour market experience years than immigrants from the United Kingdom and Ireland (18). As Table 13 shows Asian immigrants are more likely to have achieved higher educational attainment, and they are also younger than other immigrant groups. Therefore, it is reasonable that their average labour market experience is also lower than UK and Irish immigrants. Asian immigrants

have a relatively low rate of house/flat ownership. At the same time, more than half of the immigrants from the United Kingdom and Ireland own their home.

3.7. Empirical Results

In this study I have examined the effects of human capital and ethnic capital on immigrants' self-employment decisions by panel logit estimation based on the econometric model discussed in the Section 3.5. The general effects of human capital on immigrant entrepreneurship will be discussed first. In the following section, the effects of ethnic capital (ethnic network and ethnic concentration) will be discussed, as well as the specific effects of ethnic capital for different ethnic groups.

3.7.1 General Case

As noted earlier, the first survey was conducted six months after new immigrants settled in New Zealand. Therefore, binary variables such as English proficiency, children, marriage, high skilled, own dwelling and managerial and professional previous occupation in the model are treated as exogenous variables, as they are based on only the first wave's data. I use the "Panel-Logit Model" to estimate the effect of human capital

and ethnic capital on immigrants' self-employment decisions.³⁰ This estimation process is suitable for the data and it allows me to exploit the panel feature of the data.³¹

Table 14 shows the coefficients (odds ratios) obtained from the logit regressions for immigrants' self-employment decision models, and Table 15 shows the average marginal effects for those variables. In this study, I have estimated the effect of ethnic network by two different approaches: *conventional*, and *spatial*.

³⁰ I adopt the random-effects setting; the variation across immigrants is treated as random, and the unobserved effect is also assumed to be uncorrelated with the explanatory variables.

³¹ The selection of estimation method was based on a full consideration of alternative estimation methods. For example, the fixed-effects method commonly used in panel data settings is not suitable in this case, since beside the effects of ethnic capital it is important to control for the impact of other human capital variables on immigrants' self-employment decisions. In this setting, to avoid endogeneity, the measures of English proficiency, high-skilled, children, marriage, assets (e.g. own a property) and previous occupation are based on the initial wave interviews, and as such they are time-invariant, making fixed-effects estimation inappropriate.

Table 14: Panel Logit Estimates of Self-employment Decision with Network Effect: Employed Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

	<u>Conventional</u>		<u>Spatial</u>	
	(1)	(2)	(3)	(4)
Ethnic Capital				
Network Effect	/	/	2.39***	2.39***
	/	/	(0.23)	(0.23)
Ethnic Concentration Effect	/	0.08	/	-0.01
	/	(0.06)	/	(0.06)
Human Capital				
Experience	0.30***	0.30***	0.30***	0.30***
	(0.03)	(0.03)	(0.02)	(0.02)
Experience -squared	-0.005***	-0.05***	-0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.001)
Self-employment Experience (origin)	0.20***	0.20***	0.20***	0.20***
	(0.02)	(0.02)	(0.02)	(0.02)
Self-employment Experience-squared (origin)	-0.01***	-0.01***	-0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.001)
High Skilled	-0.12	-0.12	-0.18*	-0.18*
	(0.1)	(0.1)	(0.09)	(0.09)
English Proficiency	-2.16***	-2.14***	-2.00***	-2.00***
	(0.13)	(0.13)	(0.13)	(0.13)
Manager & Professional	1.61***	1.61***	1.52***	1.52***
	(0.1)	(0.1)	(0.1)	(0.1)
Personal Characteristics				
Years Since Migration (YSM)	0.42***	0.42***	0.38***	0.38***
	(0.03)	(0.03)	(0.02)	(0.02)
YSM-squared	-0.01***	-0.01***	-0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.66***	0.66***	0.64***	0.64***
	(0.07)	(0.07)	(0.07)	(0.07)
Children	-0.42***	-0.43***	-0.43***	-0.43***
	(0.1)	(0.1)	(0.1)	(0.1)
Own Dwelling	0.33***	0.33***	0.26***	0.26***
	(0.1)	(0.1)	(0.09)	(0.09)
Observations	6735	6735	6735	6735
Log likelihood	-11635.10	-11634.39	-11596.59	-11596.66
Wald Chi(2)	1268.03	1269.25	1360.31	1359.78
AIC	23294.20	23294.78	23219.18	23221.32

Note: (1) Standard errors in parentheses
 (2) * p<0.10 ** p<0.05 *** p<0.01

Table 15: Estimates of Self-employment Decision with Network Effect (Average Marginal Effects)

	<u>Conventional</u>		<u>Spatial</u>	
	(1)	(2)	(3)	(4)
Ethnic Capital				
Network Effect	/	/	0.0117***	0.0117***
	/	/	(0.0014)	(0.0014)
Ethnic Concentration Effect	/	0.0003	/	-0.0001
	/	(0.0002)	/	(0.0003)
Selected Human Capital				
Experience	0.0012***	0.0012***	0.0015***	0.0015***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Self-employment Experience (origin)	0.0008***	0.0008***	0.0010***	0.0010***
	(0.001)	(0.0001)	(0.0001)	(0.0001)
High Skilled	-0.0005	-0.0005	-0.0009*	-0.0009*
	(0.0004)	(0.0004)	(0.0005)	(0.0005)
English Proficiency	-0.0258***	-0.0252***	-0.0259***	-0.0260***
	(0.0037)	(0.0037)	(0.0037)	(0.0038)
Manager & Professional	0.0066***	0.0066***	0.0074***	0.0074***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Selected Personal Characteristics				
Years Since Migration (YSM)	0.0017***	0.0017***	0.0019***	0.0019***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Married	0.0028***	0.0028***	0.0032***	0.0032***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Children	-0.0017***	-0.0017***	-0.0020***	-0.0020***
	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Own Dwelling	0.0015***	0.0014***	0.0013***	0.0014***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

In Table 14, the odds ratios in columns (1) and (2) show results from conventional models without controlling for spatial dependence. The spatial models of interest (columns (3) and (4) in Table 14) explore the effect of ethnic network on immigrants' self-employment decisions with a spatial approach. Results in the second column, in comparison, show the effect of ethnic network through the conventional approach (the variable of ethnic concentration serves as the proxy for immigrants' network in the host country).

Based on the earlier discussion, I expect the ethnic concentration variable to reflect the outcome of a substitution and complement effect for immigrants in our spatial model. That is, once weighted ethnic-spatial lag has been controlled for, ethnic concentration shows the dominant result of the complementary and substitution effects for immigrants. As such, the second spatial model (column (4)) reflects the joint effects of network and ethnic concentration by controlling for the correlation of self-employment choices by immigrants' ethnic network.

As Tables 14 shows, immigrants' network effect is positively correlated with recent male immigrants' self-employment decisions. Ethnic network has a strong significant positive average marginal effect on the propensity of self-employment for immigrants. As a result, immigrants' self-employment decisions are positively correlated with each other, which means the immigrants' network promotes entrepreneurship among recent immigrants in New Zealand.

Compared to the conventional approach, the spatial approach offers three advantages:

Firstly, it captures a much more accurate effect of networks. The coefficient of weighted ethnic-spatial lag (ethnic network) is highly significant, which indicates that

immigrants' self-employment decisions remain correlated, ethnically and spatially, after controlling for other socio-economic variables. A positive coefficient of weighted ethnic-spatial lag indicates ethnic network plays a positive role in relation to ethnic entrepreneurship. However, the conventional approach fails to capture that significant effect. In the second conventional model (column (2) in Table 14), the coefficient of ethnic concentration (which was adopted as the proxy for ethnic network in prior studies) is not statistically significant. Therefore, by adopting the conventional approach, the significant positive effect of ethnic network cannot be observed; and we may mistakenly conclude that ethnic network does not matter in ethnic entrepreneurship.

Secondly, as discussed in section 2.4.2: Models and Estimation Method, the regression results confirm that the spatial model provides a better estimation of other socio-economic variables when the network effect is present. Table 14 shows that by controlling for spatial dependence, the estimates of the remaining explanatory variables have been changed (in most cases, the effects of other variables have been weakened). In addition, after accounting for spatial effects, a significant negative effect of education (variable "high skilled") has been observed; beforehand, it was not significant and it was weaker.

Thirdly, the spatial models provide a better data fit than do the traditional models. Since spatial models include an extra variable – weighted ethnic-spatial lag – it inevitably leads to a likelihood gain. I compared Akaike's Information Criterion (AIC) results³²

³² The AIC, provides a way of measuring a statistical model, in terms of its relative quality, for a specific collection of data. As such, it enables the selection of models. It does not allow for the testing of a model, in terms of investigating a hypothesis. However, it is appropriate when the elements of usefulness/appropriateness versus complexity are taken into consideration. The $AIC = 2k - 2\ln(L)$, where k represents the model's number of parameters, and L represents the ultimate value of the function of the model's likelihood. Adjemian, et al. (2010) adopt this approach to select the best model for an individual's choice of automobile, when considering conventional and spatial models.

and likelihood ratio tests³³ to investigate whether or not this gain is sufficient to overcome the penalty of the loss of the degree of freedom. In the analyses, spatial models in every case generate a lower AIC, which means the spatial model is the preferred method to model immigrants' self-employment decisions. Furthermore, I followed Adjemian et al. (2010) approach to conduct a likelihood test on a vector of constraints equating the spatial models to the conventional model. Test results (including AIC measures in column (3) of Table 14, compared to columns (1) and (2) for example), show that the spatial models are significantly different and they can improve the likelihood of observing the original data as constraints were rejected ($\text{Prob} > \chi^2 = 0.00$) in all cases.

As discussed in earlier sections, experience is argued to be either a "stock" (Evans, 1989) or "flow" (Kidd, 1993). In this study, I found that labour market experience works as a "stock" for recent immigrants in New Zealand. Potential labour market experience significantly increases the propensity for immigrants to be self-employed. With one more year's labour market experience, the log odds for this variable are increased by around 0.30. Therefore, with more experience, immigrants tend to obtain more skills of management and greater market information, which leads them to be more confident about operating their own businesses.

The LisNZ data allows us to examine the effects of overseas self-employment experience on immigrants' self-employment decisions in New Zealand because the survey asks how long immigrants have been self-employed in their home countries. Again, the regression results suggest that one more year's experience of overseas self-employment results in a positive change of log of odds by 0.20 (the average marginal

³³ A likelihood ratio test employs statistics to compare the fit of two different models, where one (the null model) represents a particular variation of the other (the alternative model). The test employs the ratio of likelihood, comparing the occurrence of data across the two models.

effect of that variable is 0.001). Immigrants are more likely to be self-employed than others if they have experience of self-employment in their home country.

Individuals gain knowledge of management and investment from education as well as from experience. Educational attainment reflects the ability of that individual, especially the managerial ability, to operate a business. On the other hand, individuals with higher educational attainment, it is argued, are less likely to be self-employed because higher educational attainment enhances the propensity for employment in the wage sector. The latter hypothesis of education is confirmed by the empirical findings in this study. An immigrant who attained a higher education qualification is less likely to be self-employed than is an immigrant with lower educational attainments.

The coefficients of “years since migration” (YSM) in all four models are positive at the highest level of statistical significance. By having one more year’s living experience in New Zealand, immigrants can gain more information about the New Zealand labour market and business opportunities in New Zealand, and can also expand their network. Therefore, the log of odds can be increased by around 0.38 by one year’s increase in YSM. The positive effect of YSM observed in this panel study also confirmed the positive effect of YSM found by previous international studies (e.g. Li, 2010; Toussaint-Comeau, 2008).

Other studies (e.g. Fernandez & Kim, 1998; Le, 2000) suggested that married immigrants are more likely to be self-employed. I found the same pattern in New Zealand. Marriage works as a proxy of stability and provides implications for, and background to, a risky self-employed status. Married male immigrants would be more likely to take risks than would unmarried male immigrants. As a result, marriage makes self-employment more feasible for an immigrant in New Zealand.

The binary variable “own dwelling” is used to study immigrants’ propensity for self-employment as it shows the financial ability of individuals to some extent. Kidd (1993), and Le (2000) observed that those who own their residence are more likely to select self-employment than those who rent a house. In this study, I observe the same positive effect of own dwelling. The coefficients of the dummy variable “own dwelling” in all models suggest that there is a positive and significant effect of “own dwelling” on recent male immigrants’ self-employment decision in New Zealand.

Previous studies observed both positive (e.g. Kanas, et al., 2009; Le, 2000; Toussaint-Comeau, 2008) and negative (e.g. Yuengert, 1995) effects of language proficiency on the propensity for self-employment among immigrants. This study confirms the negative effect of language proficiency on the probability of being self-employed among recent immigrants to New Zealand. The empirical evidence from this research confirms Evans’ (1989) and Light’s (1979) hypotheses on the negative effect of language proficiency. Again, as Evans indicated, lack of English proficiency can increase the propensity for self-employment by satisfying the demands for jobs as wage and salary earner. In addition, Light’s Disadvantage Theory suggests communication disadvantages, which make it difficult for immigrants to be employed in the wage sector, encourage them to be self-employed.

The ethnic network can offset those disadvantages for immigrants to some extent. We found that, generally, the ethnic network significantly promotes self-employment for immigrants in New Zealand. Recent immigrants tend to share resources (e.g. financial resources, “protected market”, business opportunities, and local market information) through their own ethnic network and tend to help future immigrant entrepreneurs to become self-employed. Therefore, the self-employment decisions of

recent immigrants are positively correlated. The ethnic network has a stronger positive effect for immigrants from traditional countries of origin than for non-traditional immigrants (immigrants from other regions except the United Kingdom).

3.7.2 By Country of Origin

The effects of ethnic capital may vary due to the culture, norms and other characteristics of different ethnic groups. In addition, immigrants from countries with language or institutional characteristics similar to the host country may show greater responsiveness to the ethnic capital Network Effect, compared to Ethnic Concentration.

In this section, I expand my analysis to examine whether we find differences across our ethnic groups. In particular, we examine the impact of the ethnic capital network variable in addition to the traditional ethnic concentration indicator and language proficiency on the likelihood of self-employment. For this we estimated the model for each of our specified ethnic groups and compare results across the groups.

I used the model reported in the last column of Table 14 to examine the data individually for immigrants from different ethnic groups. Regression results in the following tables show that potential labour market experience is more important for immigrants from Asia than it is for immigrants from the UK and Ireland. With one more year's self-employment experience, the probability of being self-employed increases much more for Asian immigrants than it does for immigrants from other ethnic groups. The coefficient of YSM suggests that Asian immigrants are more likely to benefit from the experience of living and working in New Zealand than other immigrants are.

As discussed before, previous studies observed both positive and negative effects of language proficiency on immigrants' self-employment decisions, due to the characteristics of that ethnic group. Since all recent immigrants from the UK and Ireland reported that they were proficient in English, I have dropped the English proficiency variable for them. The results confirm that proficiency in English has a strong negative effect on the self-employment decisions of recent male immigrants from Asia. The results further show that Asian immigrants who are proficient in English tend to be employed in the wage/salary sector rather than taking on the risk of operating their own businesses.

Results in Table 17 show that with one more year's labour market experience, the probability of being self-employed increases much more for UK and Irish immigrants than it does for immigrants from Asian immigrants. The odds ratios for these results are presented in Table 16. Likewise, Asian immigrants are more likely to benefit from the experience of living in the host country than are UK and Irish immigrants. Previous studies observed both the positive and negative effects of language skills on immigrants' self-employment decisions. In this study, I find that proficiency in English has a strong negative effect on the self-employment decisions of recent male immigrants from Asia. This shows that Asian immigrants who are proficient in English tend to be employed in the wage/salary sector rather than taking the risk of operating their own businesses.

Table 16: Panel Logit Estimates of Self-employment Decision by Country of Origin: Employed Male Immigrants, Age 20-55, LisNZ (Wave 1-3), Average Marginal Effects.

	United Kingdom & Ireland	Asia
Ethnic Capital		
Network Effect	2.28*** (0.66)	0.99*** (0.39)
Ethnic Concentration Effect	-0.02 (0.34)	0.12 (0.13)
Human Capital		
Experience	0.45*** (0.05)	0.4*** (0.05)
Experience -squared	-0.01*** (0.001)	-0.01*** (0.001)
Self-employment Experience (origin)	0.25*** (0.04)	0.43*** (0.06)
Self-employment Experience-squared (origin)	-0.01*** (0.002)	-0.02*** (0.002)
High Skilled	0.24 (0.17)	-1.62*** (0.21)
English Proficiency	/	-2.62*** (0.21)
Manager & Professional	0.33** (0.16)	2.08*** (0.21)
Personal Characteristics		
Years Since Migration (YSM)	0.30*** (0.03)	1.66*** (0.12)
YSM-squared	-0.01*** (0.001)	-0.08*** (0.01)
Married	0.87*** (0.12)	0.66*** (0.14)
Children	-0.92*** (0.16)	-0.61** (0.26)
Own Dwelling	0.68*** (0.15)	0.65*** (0.25)
Observations	1587	2512
Log likelihood	-4149.72	-3289.55
Wald Chi(2)	376.35	753.17

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

Table 17: Estimates of Self-employment Decision with Network Effect by Country of Origin: Employed Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

	United Kingdom & Ireland	Asia
Ethnic Capital		
Network Effect	0.0083*** (0.0026)	0.0035** (0.0015)
Ethnic Concentration Effect	-0.0001 (0.0012)	0.0004 (0.0004)
Selected Human Capital		
Experience	0.0016*** (0.0002)	0.0014*** (0.0002)
Self-employment Experience (origin)	0.0009*** (0.0002)	0.0015*** (0.0003)
High Skilled	0.0009 (0.0007)	-0.0073*** (0.0016)
English Proficiency	/	-0.027*** (0.0059)
Manager & Professional	0.0011*** (0.0005)	0.008*** (0.0014)
Selected Personal Characteristics		
Years Since Migration (YSM)	0.0011*** (0.0002)	0.0058*** (0.0008)
Married	0.0034*** (0.0006)	0.0024*** (0.0007)
Children	-0.0031*** (0.0006)	-0.0019** (0.0008)
Own Dwelling	0.0025*** (0.0006)	0.0028** (0.0014)

Note: (1) Standard errors in parentheses
(2) * p<0.10 ** p<0.05 *** p<0.01

Effects of ethnic capital

As discussed before, immigrants may face many disadvantages, such as lack of financial funds, information about the local market and its regulation, and proficiency in the local language. The ethnic network can offset those disadvantages for immigrants to some extent. I found that, in the general case, the ethnic network significantly promotes self-employment for immigrants in New Zealand. Recent immigrants tend to share resources (e.g. financial resources, “protected market”, business opportunities, and local market information) through their own ethnic network and tend to help future immigrant entrepreneurs to be self-employed. The average marginal effect of the ethnic network effect for UK and Irish immigrants is 0.0083; however, for Asian immigrants it is 0.0035; and both of them are significant. Non-traditional immigrants have a weaker network to assist them to be self-employed in New Zealand when compared to the case of immigrants from traditional source countries. When we controlled for the effect of ethnic network, the effect of ethnic concentration is not statistically significant.

I further find that, compared to immigrants from non-English-speaking origins, those from the United Kingdom and Ireland (both members of the Commonwealth) enjoy a strong ethnic network effect. Asian entrepreneurs, in contrast derive greater benefit from ethnic concentration in a specific region.

Overall, the combination of the ethnic capital variables confirms that these factors increase the propensity of immigrant self-employment through alternative means. The approach adopted in this essay allows us to account for both sets of variables allowed us to observe their separate effects.

3.8. Summary

The thrust of this essay is that while immigrants face many barriers to employment in the host country's labour market, ethnic capital (e.g. network and ethnic concentration) may help immigrants to overcome those disadvantages to some extent. By choosing a specific location, immigrants can benefit from ethnic capital and face fewer barriers to employment (e.g. self-employment).

Previous international studies adopt either ethnic concentration or language as a proxy for the immigrants' network in the host country. We contribute to this literature by adopting the "spatial model approach" to account for ethnic concentration and networks in order to capture the effects of social and resource networks for immigrant groups. We incorporate different measures of ethnic capital, in particular ethnic group economic resources and spatial-ethnic concentration. Compared to the conventional approach, the spatial approach we used in this essay offers three advantages: it captures a much more accurate effect of the network resources; it provides a better estimation of the effect of other socio-economic variables; and it provides a better data fit.

I observed positive effects on recent male immigrants' self-employment decisions from labour market experience, self-employment experience in the country of origin, and experience of living in New Zealand. Further, immigrants with better English communication skills are more likely to be employed in the wage/salary sector and might be unwilling to take the risk of operating their own businesses.

The empirical findings of this study strongly suggest that an ethnic network promotes self-employment among recent immigrants. It implies immigrants may share

socio-economic resources through their ethnic network and may help one another for self-employment. The extent of this impact varies by ethnic group.

I find that the exclusion of network correlation effect results in the underestimation of other important variables such as education and skill.

Chapter 4.

Essay Three: Ethnic Capital and Location Choices

4.1. Introduction

Location choices and employment outcomes of immigrants are important factors that influence their post-migration integration and economic success. An important but less studied factor which influences these outcomes is the strength and quality of social networks and resources that immigrants can access through location choices with access to their ethnic diaspora. By selecting a location, immigrants may access different social and ethnic resources which profoundly influence their economic performance in the host country. Among recent studies that have investigated this question, there is disagreement as to whether immigrant settlement in locations that offer a strong linguistic or ethnic concentration is beneficial or harmful to their economic success. As immigrants continue to comprise a significant and increasing proportion of populations in western countries, this question is worthy of close examination across immigrant receiving countries.

New Zealand has a tradition of accepting immigrants. The population of New Zealand increases at an uneven rate, partly because of immigration policy. That uneven population growth has consequences for the structure of skills in the workforce. The impact of immigration is an important topic from a policy point of view. There is a very large gap between public opinion concerning the effect of immigration on the labour market – the pool of native-born workers and long-established immigrants available for employment – and the facts shown by economic analysis. New Zealand introduced a points system in 1991, and its immigration policy focuses on high-skilled immigrants. A policy shock may have a significant effect on the skill base of immigrants, their

assimilation processes and their location choices. The economic performance of immigrants has a large influence on New Zealand's economy and development, and as Maré, Morten, and Stillman (2007) have explained, new immigrants may be more sensitive to regional differences in resources than immigrants who have already settled.

In this essay I examine the effect of ethnic enclaves, and the resources they offer, on location choices and employment outcomes of new immigrant settlers. In doing so, I offer a new approach to examining the strength and quality of resources for different immigrant ethnic groups in their host country across geographic locations and time.

As discussed in previous chapters, economists (e.g. Chiswick, 1978) have hypothesised that new immigrants whose first language is not English may face some disadvantages in finding a job in an English-speaking host country (such as New Zealand). However, immigrants can find certain helpful features awaiting them in the host country, such as an existing/established network of earlier immigrants of their ethnicity which they can join in a particular locality. Such features are known collectively as "ethnic capital", which was first put forward by Borjas (1992) in the context of immigrants' economic assimilation.

Borjas (1992) theorised in the context of immigrant economic assimilation that "ethnic capital" plays a key role in the human capital accumulation process, in the study of the effect of ethnic capital on the next generation of immigrants' skills. The empirical evidence suggests that the skills of the next generation of immigrants significantly depend on both parental inputs and the quality of the ethnic environment (which Borjas termed "ethnic capital"). The present study extends the definition of "ethnic capital" to include a broader set of socio-economic variables such as country of origin, average skill level, language proficiency, social network, geographic concentration, shared beliefs and other

resources for a typical immigrant group. In other words, ethnic capital is the inherent trust and advantages which stem from, and belong to, a certain immigrant group. Therefore, it was hypothesised that “ethnic capital” (referring to “ethnic network” and “primary ethnic enclaves”) may help immigrants to overcome those disadvantages to some extent. Immigrants are likely to locate in a place with greater access to this special ethnic resource. For example, in English-speaking countries, non-English speaking immigrants may benefit from “ethnic capital” and face fewer barriers in finding a job than can otherwise be expected.

As a result, location is important for immigrants. The size and quality of ethnic capital that immigrants can access varies across regions. Immigrants tend to locate in a place where it might be easier to access social and ethnic resources (e.g. network) *ceteris paribus*. Non-English speaking immigrants may benefit from ethnic capital and face fewer barriers finding a job than might be expected. Likewise, immigrants with poor skills in the host country’s language and low-skilled immigrants are more likely to be dependent on ethnic capital to find jobs and seem to be more likely to locate in a large ethnic enclave (“primary ethnic enclaves”).

This broader definition of ethnic capital is a promising arena for immigration and location choice studies. Prior empirical studies of immigrants’ location choices and employment have provided few theoretical explanations and little empirical evidence as to how ethnic capital influences immigrants’ location choices, or improves immigrants’ labor market integration. This study fills this gap in international research by adopting “ethnic capital” as a key concept in modeling immigrant location choices. This essay addresses two research questions: (1) How are immigrants’ location choices influenced

by each other's choices? (2) Why and how are immigrants' ethnic enclaves important to immigrants' labor market integration, as measured by employment outcomes?

Moreover, the approach adopted in this essay extends earlier approaches and provides a new method. Previous studies adopt either ethnic concentration or linguistic concentration as a proxy for immigrants' network in the host country (e.g. Drever & Hoffmeister, 2008; Edin et al., 2003). However, more specifically, an ethnic enclave is related to a specific location in the host country, and as such it generates special socio-economic resources and advantages to immigrants. These advantages are not exclusively "networks"; but also facilities such as a labour market that requires less language proficiency and a "protected market"³⁴ for ethnic entrepreneurs. Therefore, if one argues that an ethnic enclave is the proxy for an ethnic network for immigrants, then the effect of networks may be theoretically and empirically mixed with other effects of ethnic enclaves relating to socio-economic products and services, and employment opportunities.

In addition, to accurately capture the effect of ethnic socio-economic networks in our modelling approach, we hypothesise that location choices and resulting labor market performance of individuals may not be independent of the choices of other immigrants. We thereby extend the literature by relaxing the strong assumption in this context that immigrant location choices are independent and identically distributed (this allows us to relax the i.i.d. assumption). We further extend the literature by adopting the "ethnic spatial autoregressive network" to account for networks, in order to capture the effects of social and economic resource networks for immigrant groups. By doing so, we are able to construct a representation of the individual's network of socio-economic resources from individual level data, and observe the correlation of immigrants' location choices.

³⁴ The immigrant market is claimed to be a "protected market" (e.g. Aldrich, et al., 1985; Boyd, 1990) because immigrants have a specific demand for ethnic goods and services.

We then incorporate this network effect in explaining the role of enclaves in employment success of immigrants.

In this setting, “primary ethnic enclave” for immigrants is identified in New Zealand based on calculations of residential concentration quotient (RCQ)³⁵ according to their ethnicity (for example, Auckland region is the primary ethnic enclave for immigrants from Asia).³⁶ The approach to modelling location choices in the international literature is to adopt the logit model for empirical studies of the location choices of immigrants, and this is the approach that will be adopted in this study.³⁷ Both immigrants’ personal characteristics and a destination’s characteristics are considered in the analysis of immigrants’ location choices.

The approach to modelling location choices in the international literature is to adopt the logit model for empirical studies of the location choices of immigrants, and this is the approach adopted in this chapter. In addition, in order to construct the ethnic network for immigrants and to examine the effect of the ethnic network on immigrants’ location choices, the spatial model has been adopted in this study. In order to track the dynamics of immigrants’ decisions on location, some adjustments will be made. Both immigrants’ personal characteristics and a destination’s characteristics are related in any analysis of immigrants’ location choices in order to model immigrant settlement location choices accurately.

³⁵ More details of RCQ and the definition of “primary ethnic enclave” are provided in Section 4.4: Model and Data.

³⁶ I want to draw on the concept of primary ethnic enclave to dichotomise New Zealand regions according to RCQ, as specific localities could be particularly meaningful to particular groups of immigrants. One such example is the significance of Auckland to Asian communities. Consequently, it is important to emphasise the role of place in influencing socio-economic integration within a host nation. I found that RCQ provides the most robust methodology by which to identify specific localities in New Zealand.

³⁷ I adopt the “Panel Logit Model” in order to take advantage of the panel data.

The test of alternative hypotheses based on the theory of ethnic capital can point out how ethnicity influences immigrants' location choices in New Zealand. An examination of data from the Longitudinal Immigrant Survey: New Zealand (LisNZ) can help us identify the factors that influence immigrants' decisions in their initial stage of settlement in New Zealand.

4.1.1 Structure of Essay Three

This essay is organised as follows. Section 4.2 reviews the literature on immigrants' location choices. Section 4.3 provides hypotheses based on ethnic capital. Section 4.4 discusses the econometric models and describes the data set used in this study. Empirical analyses are provided in Section 4.5 and Section 4.6, followed by the summary in Section 4.7.

4.2. Relationship to Previous Studies on Immigrants' Location Choices

Immigrant's choice of location plays a vital role in their economic integration. Previous international studies have analysed how ethnic enclaves attract immigrants (e.g. Bauer, Epstein, & Gang, 2005; Funkhouser, 2000); however, the effect of ethnic networks on immigrants' location behaviour remains unknown. Likewise, the relationship between the effect of ethnic networks and the effect of ethnic enclaves on location choice is also not clear from previous studies.

Because an ethnic enclave relates to a specific location in the host country, it provides spatial advantages to immigrants such as a "protected market" for self-employment. Therefore, if one argues that an ethnic enclave is the proxy of an ethnic network for immigrants, then the effect of ethnic networks may be mixed with other effects of ethnic enclaves relating to socio-economic variables.

In this study, I hypothesise that the labour market performance of individuals may not be independent of other immigrants – independent and identically distributed – to their location choices. One of the contributions of this study is that the immigrants' ethnic network for location choices has been constructed by the spatial model. The "spatial lag" in the spatial model shows the correlation of immigrants' location choices and it is not concerned with the other effects of ethnic enclaves. Therefore, this study is designed to fill the identified literature gap.

The empirical literature on economic outcomes for immigrants generally assumes that individual decisions are independent of other immigrants. However, individuals are mutually linked through friendship, kinship, and fellow relationships. In this context experiences, knowledge, information and other products are produced and shared through social networks. Previous studies show that social networks may exert a

significant influence on an individual's labor market performance, such as employment (e.g. Frijters et al., 2005). For example, individuals may benefit from their friendships; their friends may introduce job opportunities to them or assist them with their job applications. Social networks are argued to be "the most profitable avenue of job search" for immigrants (Frijters et al., 2005).

4.2.1 Review of Previous International Studies

Recent international studies have paid much attention to the effect of ethnic variables on an immigrant's choice of location. These ethnic variables include language, ethnicity, ethnic concentration and ethnic enclave. However, the effect of an ethnic network has not been examined in these studies.

A large proportion of economists (such as Buckley, 1996; Dunlevy, 1991; Kobrin & Speare, 1983) believe that previous immigrants would build an ethnic environment that would attract and help newly arrived immigrants from the same ethnic group. In addition, Bartel (1989) and Epstein (2002) indicated that immigrants are more likely to move to a location having a large proportion of immigrants from the same ethnic group.

In a Canadian study, Trovato and Halli (1990) find that language is also important in explaining the location behaviour of immigrants as well as ethnicity. They claim that ethnicity and language skills are closely correlated, so some limited effect of ethnicity would also be expected. Another study suggested low-skilled immigrants and those with limited English proficiency prefer to settle in a region with a large ethnic enclave (Scott, Coomes, & Izyumov, 2005).

Other recent studies have presented evidence of an interaction between ethnic variables and individual characteristics. Bauer, Epstein and Gang (2005) claimed that ethnic enclaves have a significant effect on immigrants' educational attainment and English language ability. Chiswick and Miller (2002a) found an ethnic enclave will reduce immigrants' language skills.

Lazear (1999) developed a model of migration assimilation and found that individuals who lived in an area with a large proportion of immigrants from the same ethnic group are less likely to become assimilated and to learn the local language. In addition, some immigrants face a much higher cost to learn the local language; so they would prefer to stay in the ethnic enclave in order to reduce the cost of studying another language. Furthermore, the effect of an ethnic enclave on immigrants' income is not clear. Immigrants' income will be reduced if they are located in an ethnic enclave or have poor English language proficiency (Chiswick & Miller, 2002a).

When using the 1980 US Census data, McManus (1990) in contrast found that an ethnic enclave will reduce costs for learning English and also offers better jobs with higher salaries for immigrants. Some economists (such as Bartel, 1989) have attempted to find the effect of the interaction of individual and destination characteristics. They found a strong correlation between the education level of immigrants and destination characteristics; they suggest education reduces the effect of the ethnic enclave on immigrants' location choices.

4.2.2 Review of Previous New Zealand Studies

Immigrants' location choices are less examined in the New Zealand literature; only a few recent studies have paid attention to this issue. By using 1996 and 2001

Census data, Maré, et al. (2007) identified local labour markets (LMAs) for every New Zealand region. In their study, immigrants chose to locate in either a LMA or other areas within a specific New Zealand region. They focused on examining how characteristics of LMAs attracted immigrants for settlement.

Grbic, Ishizawa and Crothers (2010) have further conducted an empirical study on ethnic residential segregation in New Zealand, by using 1991, 1996, 2001, and 2006 Census data. They specifically discussed recent Asian immigrants' location choices in New Zealand. In this section, I discuss these two New Zealand studies and their empirical findings.

Previous New Zealand studies indicate some important implications for understanding the locational choices of recent immigrants to New Zealand. Three important questions still have not been answered by previous New Zealand studies: (1) Where are primary ethnic enclaves for immigrants in New Zealand? (2) What are the socio-economic factors that pull immigrants to locate in their primary ethnic enclaves? (3) How ethnic network influences immigrants' location choices in New Zealand? To provide a remedy, this study employs the discrete choice model to investigate those questions.

Prior New Zealand studies adopt ethnic concentration (e.g. Maré et al., 2007) as the proxy for immigrants' ethnic network.

Settlement patterns of recent immigrants to New Zealand

Most prior literature has focused on and concluded that immigrants' locational choices are dependent on the number of existing immigrants who have already settled in the area. Taking an explicit labour economics perspective, Maré et al. (2007) were particularly interested in the interrelations between immigrants' locational decisions and the labour market conditions in the New Zealand context. Main arguments from existing literature include that settlement of new immigrants changes local population structure, and potentially affects local labour market opportunities (Borjas, 1994; Friedberg & Hunt, 2005). They hypothesise that immigrants are more responsive than existing local residents to locality resources and hence they improve the efficiency of the local labour market (Borjas, 1995). It was also suggested that the congestion effects of immigrants can also negatively influence local infrastructure or result in the increase of demand, and therefore prices, for certain goods and services (Poot, 1998; Saiz, 2006).

To investigate the rationales for recent immigrants' settlement decisions, Maré et al. (2007) used New Zealand data from the 1996 and 2001 Censuses. These data allowed for sampling on each individual's country of birth, year of first arrival in New Zealand, age group, usual residential locations both on the date of census and five years before the census. To ensure the samples' validity and relevance for their study, the authors selected the 30-54 age group to rule out young students and senior retirees. Recent immigrants referred to those who arrived in New Zealand within five years immediately prior to the census, and those who arrived between five and ten years were defined as earlier immigrants.

Borrowing Papps and Newell's (2002) work on the 58 local market areas (LMAs), Maré et al. (2007) were able to focus on those individuals who both worked and

lived in the same LMA. As a result of the application of their sampling methods, the authors obtained an analysis population of 1.04 million from the 1996 Census, of whom 91% were New Zealand born, 5% were recent immigrants and 4% were earlier immigrants. Likewise, of the 1.11 million individuals from the 2001 Census, 90% were born in New Zealand, 6% were recent immigrants and 4% were earlier immigrants.

Analysis showed that of the 58 LMAs in New Zealand, the Auckland and South Auckland LMAs have a consistently concentrated population of recent immigrants over time. Of the New Zealand born, those with university degrees appeared to be more geographically concentrated, while those recent and earlier immigrants with post-school qualifications and university degrees were less geographically concentrated. Ethnic groups were found to have significant effects on geographical concentration. New Zealand-born Asians, Pacific Islanders, and others were increasingly more geographically concentrated than their European and Maori counterparts. Recent and earlier immigrants from Asia and the Pacific Islands were also found to be the most geographically concentrated.

In general, earlier immigrants were more mobile than those who were born in New Zealand, which sheds light on the resettlement decisions of recent immigrants after they have been in New Zealand for five years. Maré et al. (2007) then examined the characteristics of LMAs where recent and earlier immigrants were resident. Results showed that recent and earlier immigrants were more likely to reside in LMAs with denser networks of immigrants from the same region of birth, with larger foreign-born populations, and with larger general populations. The census data also provided evidence, in a weak sense though, that immigrants' locational decisions favoured better local economic conditions, especially higher LMA average wages.

How significant the LMA labour market conditions were in the immigrants' locational decisions remained unknown from the descriptive analysis. Therefore, to provide a remedy, the authors then conducted a regression analysis by using McFadden's discrete choice model to investigate the initial locality of recent immigrants and the location of earlier immigrants, and compared these results with local labour market characteristics. In general, it was evident that recent immigrants' locational decisions were largely influenced by the density of immigrant populations. They were particularly likely to choose to settle in LMAs where earlier immigrants from their same region of birth constituted a large proportion of the local population. Overall, recent immigrants were more likely to choose a more populous LMA for settlement. However, their analysis did not find a strong relation between local labour market conditions and recent immigrants' locational decisions.

In addition, when taking the immigrants' personal backgrounds into consideration, Maré et al. (2007) suggested, surprisingly to an extent, that ethnic concentration (as the proxy of immigrant network) was more significant in settlement decisions of recent immigrants from English-speaking backgrounds than those with non-English-speaking backgrounds. Moreover, it was evident that higher employment rates in local LMAs were attractive to recent immigrants from non-English-speaking regions, but not to those from English-speaking regions.

Ethnic residential segregation in New Zealand, 1991–2006

Grbic, et al. (2010) conducted an empirical study on ethnic residential segregation in New Zealand, by using census data from 1991 to 2006. This study took a further step into understanding the locational decisions of immigrants to New Zealand. Due to the increase in New Zealand of the Asian population in the last thirty years, this

study had a focus on immigrants from Asia, and those from traditional European source countries. The authors used a multivariate analysis, investigating the effects of ecological context and measures derived from spatial-assimilation theory on levels of segregation between ethnic groups, especially between the minority and majority groups.

They reviewed New Zealand's immigration history first. Historically, having Maori as the indigenous people, New Zealand received massive numbers of European immigrants in the 19th and early 20th centuries. This migration pattern resulted in Europeans becoming the majority ethnic group in New Zealand's population. Similarly, immigrants started arriving from the Pacific Islands later in the 20th century. The number of Asian immigrants has increased rapidly since the 1990s as a result of the change in New Zealand's immigration policy to allow more immigrants from non-traditional countries who have skills to contribute to the local labour market. In general, it is found that Asian immigrants are more spatially dispersed than Maori and Pacific Islanders (Johnston, Poulsen, & Forrest, 2002; Poulsen, Johnston, & Forrest, 2000).

Grbic et al. (2010) framed their study with the spatial-assimilation theory (Massey, 1985; Massey & Denton, 1988) and New Zealand's ecological context (i.e., the structural and demographic characteristics of a geographic area). The spatial-assimilation theory argues that the increase of income for minority groups can be achieved through a lower level of residential segregation from the majority group. Grbic et al. (2010) hypothesised within the New Zealand context that when minority groups had a low level of segregation, their income would be close to that of their European counterparts. Also according to the spatial-assimilation theory, immigrant groups are residentially integrated across generations when they acculturate.

Grbic et al. (2010) indicated that new immigrants may utilise their networks to help them to make location decisions. Therefore, with the effect of the ethnic network, immigrants are more likely to concentrate. If the existing neighbourhoods could not accommodate new settlers, then those new arrivals would move into areas which are close to those neighbourhoods and have smaller populations of immigrants from the same region. As a result, drawing from this assumption that the concentration of an ethnic group in a certain area would attract new immigrants from the same group to settle in the same or nearby areas (Fong & Wilkes, 2003). Grbic et al. (2010) proposed that the relationship between the population growth rate for a co-ethnic group was positive.

They then used data from the 1991, 1996, 2001, and 2006 New Zealand Census of Population and Dwellings to examine the patterns of residential segregation for the three minority groups: Asian, Maori, and Pacific people, from the majority European ethnic group. Their examination was conducted across territorial authorities (N=73). As these authorities covered the entire country, the data included all individuals of New Zealand. The authors then used area units, which were non-administrative geographic areas, to examine the distribution of ethnic groups between neighbourhoods within the territorial authorities. Their multivariate analysis was aggregated at the territorial authority level, because necessary data were readily available at this level.

Analysis indicated that of the three main minority ethnic groups, Asians were found to be the least segregated from Europeans between 1991 and 2006, but their dissimilarity effect increased in the same time period. Pacific Islanders were in comparison the most segregated from Europeans between 1991 and 2006. A further examination suggested that this increase was largely a result of the fast-growing Asian population in certain territorial authorities, such as Auckland and Christchurch. In

general, Asians had a high likelihood of interaction with Europeans, especially in the territorial authorities where the Asian population was relatively small, such as Dunedin. The segregation of Asians from Europeans had gradually increased although generally remained at a low level. This might be a result of the rapid increase in Asian population in the more populated territorial authorities, such as in Auckland.

As for the ecological context of New Zealand, Grbic et al.'s (2010) analysis indicated that the growth of the Asian population was negatively related to Asian-European segregation, which opposed previous expectations. It was therefore estimated that the continual growth of the Asian population in New Zealand would decrease segregation of Asians from Europeans over time.

4.3. Theoretical Framework of Ethnic Capital

4.3.1 Ethnic Network and Settlement Decisions

Compared to natives, immigrants may be more dependent on their social networks in order to be economically assimilated, because they usually have less knowledge of the host country's labour market than the natives or earlier immigrants. For these reasons, individuals' labour market performance may not be independent of other immigrants (independent and identically distributed). Thus, their labor market performance is correlated with each other to some extent. For these reasons, social networks may act positively on the settlement process for immigrants and their labor market performance.

As a result, ethnic networks may encourage immigrants to be concentrated spatially. According to the ethnic network hypotheses put forward by Piore (1979) and Kobrin and Speare (1983), previous ethnic networks assist new immigrants to adjust to the new environment in the host country, enhance new immigrants' feelings of security, solidarity, and identity within the ethnic group since they share the same culture, language and norms with each other. At the initial stage of immigration, ethnic network plays a vital role to help immigrants in settling down and accessing employment opportunities. Munshi (2003) observed that networks reduce the costs of employment for immigrants and offer higher paying jobs. In addition, they found that ethnic networks facilitate new immigrants to locate in the ethnic enclave (spatial and ethnic-specific environment in the host country). As such, new immigrants gradually adapt to the new environment and learn to merge with the local community.

4.3.2 Primary Ethnic Enclave (High Level of Ethnic Concentration)

Ethnic networks can affect immigrants' labor market performance through different channels. Immigrants may find greater opportunities of employment through geographic concentration. Firstly, primary ethnic enclaves create job opportunities for immigrants by lowering the requirements for employment (e.g. having skills in the local language, or a recognised qualification). In addition, immigrant-owned businesses are considered to be the main source of employment opportunities for immigrant employees who come from the same immigrant group. It has been observed that even after being located in the US for six years, there were still around 40% of Cuban immigrants who were working for Cuban-owned businesses (Portes, 1987). Secondly, the immigrant market is potentially important for local mainstream companies. With the growth of the ethnic enclave, the immigrant market becomes a non-negligible market in the host country. Local businesses would also like to hire immigrants to serve and develop the immigrant market. In this scenario, there will be more job opportunities to be offered to immigrants from the mainstream economy. As native-born employees might know little about immigrants' culture and language, mainstream companies may consider hiring immigrants to serve the target immigrant market.

Recent international studies have generally indicated a negative effect of ethnic concentration on immigrants' labor market performance. For example, Chiswick and Miller (2002b), and Bertrand et al., (2000) showed that linguistic concentration negatively influenced immigrants' labor market performance in the United States.

In contrast, Edin et al., (2003) showed that immigrants' earnings were positively correlated with the size of ethnic concentration in Sweden. Other international empirical studies have observed a negative relationship between ethnic concentration and the

propensity for employment among immigrants (e.g. Aldrich & Waldinger, 1990; Clark & Drinkwater, 1998; Clark & Drinkwater, 2000b). For example, Aldrich and Waldinger (1990) claimed that the negative effect of the ethnic enclave on immigrants' employment is due to the effect of limiting opportunities, and the existence of too much competition within the ethnic enclave. In this case, the growing ethnic enclave could not generate sufficient opportunities and other socio-economic resources for immigrants to be employed.

However a stream of other studies has focused on the network effects of immigrant enclaves. As such, primary ethnic enclaves might increase the employment possibilities for immigrants in and out of that ethnic enclave. Therefore, immigrants may benefit from a high level of ethnic concentration, as more job opportunities could be generated by ethnic and geographic concentration. As such, an ethnic enclave facilitates employment within the ethnic enclave (e.g. by reducing the necessity of learning English).

4.3.3 Other Variables

Language proficiency: Immigrants with host country language proficiency may be less likely to locate within an ethnic enclave than those with less proficiency. Like previous studies, Scott et al. (2005) indicate that with fluency in English, immigrants face fewer difficulties in communicating and obtain information on local labour markets. However, immigrants without proficiency in English may face greater barriers outside of the ethnic enclave as they lack basic skills (English communication) for employment in the mainstream economy. Likewise, it would be less problematic for them to live and work within the ethnic enclave. Therefore, we hypothesise that primary ethnic enclaves

should have a greater influence in attracting new immigrants from non-English speaking countries, and immigrants that are less proficient in English.

Years since Migration: Immigrants with more years of experience living in the host country are potentially less likely to locate in the region with a large ethnic enclave, as they may be more experienced in utilizing resources (such as services, facilities, etc.) provided by the local community than their counterparts. As a result, immigrants with longer “years since migration” (YSM) may be more confident to locate outside of ethnic enclaves than new immigrants.

Marital status: Primary ethnic enclaves also may provide more opportunities for single immigrants to find their partners. Thus unmarried immigrants may choose large ethnic enclaves in which to locate, as it may provide much greater opportunities for marriage.

Ethnic Enclaves and Skill Level: There is a controversy as to whether primary ethnic enclaves more strongly attract high-skilled or low-skilled immigrants. For example, less-skilled immigrants may be more reliant on ethnic capital and choose a large ethnic enclave to settle down. Compared to less skilled immigrants, finding employment in the local mainstream economy is usually much easier for high-skilled immigrants (e.g. with educational attainment of university degrees). As a result, high-skilled immigrants might be less likely to choose large ethnic enclaves to locate in than less-skilled immigrants. We test these hypotheses.

4.4. Model and Data

4.4.1 Basic Model

The econometric specification of the model is based on multinomial logit model (McFadden, 1974). In modelling location choices new immigrants to New Zealand choose among a set of J possible regions for location. Each possible destination j provides a utility level U_{ij} for immigrant i . Individual i will maximise their utility and choose the place where they can have the highest utility. In addition, immigrant i 's utility is a linear form of the level or change in the destination's characteristics L_j (e.g. the average real income for that place), individual's characteristics X_i (e.g. education level and English proficiency), and ethnic variables E_{ij} (e.g. ethnic network), and an error term, ϵ_{ij} :

$$U_{ij} = f(L_j, X_i, E_{ij}) \quad (62)$$

If $\epsilon_{ij} \sim i.i.d.$ the probability of individual i choosing location l (where $l \in J$) is:

$$P(y_i = l) = \frac{\exp(L_j' \xi + X_i' \varphi + E_{ij}' \phi + \epsilon_{ij})}{\sum_{j=1}^J \exp(L_j' \xi + X_i' \varphi + E_{ij}' \phi + \epsilon_{ij})} \quad (63)$$

where y_i is immigrant i 's location choice, $Z_{ij} = [L_j \ X_i \ E_{ij}]$, and $\beta = [\xi \ \varphi \ \phi]'$ is the parameter vector. The parameters are estimated by maximum likelihood. In addition, this analysis requires estimation using $N \times J$ observations (where N is the number of immigrants). For the New Zealand case, there will be 16 regions³⁸.

³⁸ New Zealand regions are: Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Taranaki, Manawatu-Wanganui, Wellington, West Coast, Canterbury, Otago, Southland, Tasman, Nelson, and Marlborough.

The marginal effect of change in a variable on the probability that immigrant i will choose a specific location l is the derivative of equation (63) with respect to the explanatory variables, as follows:

$$\frac{\partial P(y_i=l)}{\partial z_l} = [P(y_i = l)(1 - P(y_i = l))]\beta \quad (64)$$

Furthermore, Bauer, Epstein and Gang (2005) have developed a logit model and they explore the effect of English language proficiency on the location choices:

In their analysis, they define y_i as a random variable that takes the values 0 and, 1 indicating the location choice made by the migrant. The probability that individual i chooses the US community j can then be written as:

$$P(y_i = l) = \frac{\exp(Z_j\gamma)}{\sum_{j=1}^J \exp(Z_j\gamma)} \quad (65)$$

Equation (65) can be estimated using maximum likelihood. Z_j is a vector of the characteristics of the US community j , which includes the unemployment rate (U_j), the total population (P_j). Therefore, they have estimated a fully interacted model, as follows:

$$P(y_i = l) = \frac{\exp(L_i Z_j \gamma)}{\sum_{j=1}^J \exp(L_i Z_j \gamma)} \quad (66)$$

where L_i is a vector of binary variables, indicating the language ability of individual i . Comparing the estimated coefficients γ from equations (65) and (66) allows

one to test whether the effects of networks on the location choice of migrants differs by the language ability of the immigrants.

My modelling approach in this study follow a similar approach to Bauer, Epstein and Gang (2005) on including the effect of English language proficiency on immigrants' location choices. The model in this essay enhances the conventional method by including the spatial network effect.

4.4.2 Ethnic-Spatial Approach

As noted earlier, previous studies adopt either ethnic concentration or language as a proxy for immigrants' network in the host country (e.g. Chiswick & Miller, 1996). This study differs from earlier studies, as I adopt the "ethnic spatial network approach" to account for networks. This modelling approach allows a greater facility in order to capture the effects of social and resource networks for immigrant groups.

The spatial model has often been used in studies such as real estate and choice of automobile type (e.g., Adjemian, Lin & Williams, 2010). In this study, the "Spatial-Lag Matrix" is constructed with micro data, based on the three conditions of 1) ethnic group, 2) region of residence, and 3) year of survey. Therefore, I am keen to better understand the migrants' network effect through the data. If immigrants were to shift location, the demographic composition of related localities would alter (for example, the number of Asian immigrants in related regions would change). The ethnic-spatial weighted matrix, W , captures this dynamic. In addition, since W is derived by normalising the ethnic-spatial neighbourhood matrix, E , through unifying the row sums, the elements of W

always fall in the range of 0 and 1.³⁹ The spatial model provides the analytical framework to investigate the effect of ethnic capital. Under the ethnic capital hypothesis, individuals' location choices and economic performance depend on ethnic capital and other socio-economic variables. In this setting, one can define individuals who are from the same ethnic group and location as the first-order "ethnic neighbours". Thus, "ethnic-spatial dependence" represents the case that an individual's labour market performance is influenced by their ethnic neighbours' labour market performance and other ethnic-capital factors in that location.⁴⁰ I use data from all three waves of the LisNZ survey and use panel maximum likelihood estimation method. As already mentioned, the network matrix ("Spatial-Lag Matrix") is also dynamic for each year of panel data. Details of the "ethnic-spatial weight matrix" and "ethnic spatial autoregressive process" are provided in Essay One.

4.4.3 Conditional Spatially Autoregressive Discrete Location Choice Model

The binary spatial-lag model is widely used in examining household automobile choices (e.g. Adjemian et al., 2010; Brock & Durlauf, 2001; Goetzke, 2008). This study is the first application of this approach in the field of immigration research and immigrants' location choices. According to the hypotheses of ethnic capital, in this essay we investigate how ethnic enclave(s) attracts recent male immigrants to move in. The logit model is widely employed in testing such discrete choices as location choice (locate in ethnic enclave(s) or not). In this essay, I have adopted similar settings for a binary spatial-lag model as Adjemian, Lin & Williams (2010). Immigrant i chooses a location

³⁹ More details about ethnic-spatial weighted matrix, W , and ethnic-spatial neighbourhood matrix, E are provided in the section of the model in Essay One.

⁴⁰ Immigrants are defined to be ethnic neighbours when they are belong to the same ethnic spatial network.

which will maximise his utility. For a specific location j the utility for a recent male immigrant is given by:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (57)$$

where V_{ij} shows the deterministic portion of utility, ε_{ij} represents a random component. Then, the deterministic utility is composed of a set of explanatory variables and a spatial lag (which represents social network effect):

$$V_{ij} = \beta' x_i + \rho' Wf(V_{ij}) \quad (58)$$

where x_i is a set of socio-economic variables for immigrant i , such as education attainment, year since migration, age, other demographic variables, and local characteristics; W is the spatial weight matrix which indicates the first-order ethnic neighbourhood for every immigrant. As a result, the coefficient of W represents the effect of ethnic network on immigrant i 's utility from choosing a specific location in New Zealand.

The immigrant makes a decision as to whether to locate in his ethnic enclave or not. The specific location being considered when $j=1$; where k represents the alternative choice. As a result, the decision rule for immigrant i is expressed as:

$$\begin{aligned} \Pr[y = j] &= \Pr[U_{ij} > U_{ik}] \quad \forall k \neq j \\ &= \Pr[U_{ik} - U_{ij} < 0] \\ &= \Pr[V_{ik} + \varepsilon_{ik} - V_{ij} - \varepsilon_{ij} < 0] \\ &= \int I(\varepsilon_{ik} - \varepsilon_{ij} < V_{ij} - V_{ik}) f(\varepsilon_{ik}) d\varepsilon_{ik} \end{aligned} \quad (59)$$

where the indicator function I takes the value of one if the expression in parentheses is true, otherwise it is equal to zero. In addition, the assumption of independent random error is held, and ε is identically Bernoulli distributed for all immigrants (see Adjemian et al., 2010). Therefore, the probability of immigrant i deciding to locate in location j is given by the logistic probability:

$$P_{ij} = \frac{1}{1+\exp(V_{ij})} \quad (60)$$

4.4.4 Estimation Issues

Previous studies highlight that in the spatial discrete choice models the network effect acts as a signal or a kind of knowledge (see Goetzke, 2008), indicating that the spatial spillover could be unidirectional rather than multidirectional (e.g. Adjemian et al., 2010). This is the approach taken in this study. For example, we can suppose that every immigrant can only make one location decision per round (e.g. a specific year). Once immigrant i has made a location choice, immigrant k is going to learn about this information and takes this knowledge as one of the factors to assist him to make a decision on whether or not to settle in his main ethnic enclave(s). However, immigrant k 's decision is not going to influence immigrant i 's decision again in the same round.

Under this assumption, there will be no spatial autocorrelation assumed in the error term, and the spatial-lag term (ethnic network in this study) is assumed to be an exogenous variable. Therefore, under such setting, this model is conditional upon the observed neighbouring location choices, and the spatial choices correlation is not modelled as an endogenous variable. Anselin (2002) named this model as conditional spatially autoregressive discrete choice model. One of the advantages of this modelling

approach is the simplified computation processes, in estimating a large weighted matrix by employing the maximum likelihood estimator.

4.4.5 Definitions of Primary Ethnic Enclave(s)

In this essay, the primary ethnic enclave for an ethnic group is defined based on the calculations of residential concentration quotient (RCQ).

$$RCQ_{ij} = \frac{P_{ij}/P_j}{P_{im}/P_m} \quad (68)$$

where $j=(1,\dots,16)$ represents sixteen New Zealand regions⁴¹ at regional council level⁴²; P_{ij} is the number of immigrants from a typical ethnic group and located in region j ; P_j refers to the total population in region j ; P_{im} is the total population size of immigrants from ethnic group i in New Zealand; and lastly, P_m is equal to the total New Zealand population size.

Therefore, when RCQ is equal to 1, ethnic concentration of immigrant ethnic group i in a certain region j is at par with that of the country average. In the case of RCQ

⁴¹ New Zealand regions are: Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Taranaki, Manawatu-Wanganui, Wellington, West Coast, Canterbury, Otago, Southland, Tasman, Nelson, and Marlborough.

⁴² The majority of American studies (e.g. Yuengert, 1995, Borjas, 1986) have examined immigrants' geographical decisions in light of Metropolitan Statistical Areas. I would argue that New Zealand's 'regions', as generally organised around a major city, are quite equivalent, in terms of size. Given that this essay emphasises the impact of ethnicity and location on employment levels, it follows that I consider immigrants' location choices and employment outcomes at the New Zealand regional level. As such, immigrants living in one suburb of a region are able to access knowledge/information, indirectly, regarding job opportunities in other suburbs of that region, and a network is likely to develop within that region. For example, Immigrant A, located in a western suburb has a friend, Immigrant B, located in the central suburb, connected to a third friend, Immigrant C, residing in an eastern suburb. Therefore, Immigrant A may obtain information about job opportunities in the eastern suburb through the network. Taking into account this information, and adopting our ethnic spatial weight matrix (W), I aim to capture the impact of an entire network on a particular location. Another relevant scenario is that immigrants might cluster in one region, but be employed elsewhere. For example, some immigrants may live in one suburb, yet work in another suburb. Therefore, I think in considering their locations, the regional perspective helps to best address this in this setting.

greater than 1, it shows a larger level of ethnic concentration for immigrant group *i*. There is lack of definite quantifiable criterion in ethnic enclave, and different studies adopt different threshold values: e.g. in Parks' (2004) paper, the cut-off RCQ is 5; Zhu, Liu and Painter (2013) adopt a value of 1.5 for RCQ.

In this analysis, I adopt a threshold of RCQ of 1.2 to identify the primary ethnic enclave for immigrants in New Zealand. In this case, a threshold of RCQ of 1.2 allows me to identify at least one primary ethnic enclave for every ethnic group in New Zealand (Table 18 provides the derived RCQ measure for all New Zealand regions). According to this definition, the primary ethnic enclave(s) for Asian immigrants is Auckland region, for immigrants from the UK and Ireland it is Wellington and Nelson regions.

Table 18: Residential Concentration Quotient (RCQ)

	Northland Region	Auckland Region	Waikato Region	Bay of Plenty Region	Gisborne Region	Hawke's Bay Region	Taranaki Region	Manawatu- Wanganui Region
Australia	1.139	0.996	0.977	1.048	0.744	0.833	0.904	0.836
Pacific Islands	0.198	2.271	0.376	0.237	0.264	0.415	0.133	0.299
United Kingdom and Ireland	0.960	1.086	0.865	1.002	0.523	0.878	0.765	0.770
Europe (excl. United Kingdom and Ireland)	0.934	1.170	0.880	0.826	0.427	0.692	0.641	0.579
North America	1.124	1.052	0.785	0.851	0.655	0.613	0.603	0.712
Asia	0.185	2.044	0.524	0.350	0.149	0.246	0.233	0.401
Other	0.542	1.727	0.826	0.641	0.356	0.544	0.473	0.512

	Wellington Region	Tasman Region	Nelson Region	Marlborough Region	West Coast Region	Canterbury Region	Otago Region	Southland Region
Australia	0.989	1.213	1.284	0.977	1.137	1.048	1.211	0.752
Pacific Islands	1.008	0.068	0.197	0.171	0.105	0.291	0.205	0.150
United Kingdom and Ireland	1.208	1.195	1.408	0.962	0.588	1.030	0.921	0.492
Europe (excl. United Kingdom and Ireland)	1.229	1.412	1.366	0.884	0.674	1.036	0.893	0.572
North America	1.253	1.588	1.799	1.033	0.788	1.039	1.366	0.469
Asia	0.818	0.158	0.306	0.188	0.121	0.733	0.491	0.131
Other	0.918	0.456	0.529	0.591	0.353	0.627	0.593	0.245

Note: Raw data are taken from published 2006 New Zealand Census table: Birthplace (Broad Geographic Areas) by Sex, for the Census Usually Resident Population Count (2006)

4.4.6 Data

In this study, I use the Longitudinal Immigrant Survey: New Zealand (LisNZ) data to examine recent immigrants' location choices in New Zealand. The LisNZ project includes three interviews (which are also referred to as "waves") with the same group of selected immigrants. The first wave (wave 1) interviews are conducted six months after new immigrants settle in New Zealand. The second wave (wave 2) is conducted 12 months after the wave 1 survey. The last survey (wave 3) is conducted in the 36th month

after the immigrants have settled in New Zealand. Immigrants were sampled at the time they were granted residence. The survey sample was selected from migrants aged 16 years and over who were approved for permanent residence in New Zealand from 1 November 2004 to 31 October 2005.

One of the positive features of this longitudinal survey is that longitudinal surveys are designed and used to collect information (e.g. location choices) from a sample of migrants on several occasions, thus capturing information on the complete dynamics of the migration and settlement processes. Another significant advantage of the data set is the comprehensive set of variables, including measures of English proficiency (self-reported). I have selected all male-immigrant observations in the survey whose ages are between 20 and 55 years. The total sample size is 8,020 across the three survey waves.⁴³ Notably, there are 3,183 observations for immigrants from the UK and Ireland; and 1,809 from Asia⁴⁴.

⁴³ I have dropped some observations due to missing data issues.

⁴⁴ According to the 2006 New Zealand Census (Statistics New Zealand, 2006), New Zealand received more immigrants from Asian countries than before. In the analyses I consider the major ethnic groups from the UK and Ireland, Asia, the Pacific Islands, and the rest of the world.

Table 19: Definitions and Variable List

<i>Human capital</i>	
Work experience	This is a derived variable which is equal to an individual's current age minus the age of graduation.
Proficiency in English*	Binary variable=1 if that individual is proficient in English (self-reported).
High Skilled*	Binary variable=1 if that individual's highest education attainment is Bachelor or higher.
<i>Personal Characteristics</i>	
Years since migration (YSM)	This variable represents the duration of immigration.
Married*	Binary variable=1 if married.
Children*	Binary variable=1 if that immigrant has children.
Own dwelling*	Binary variable=1 if that immigrant has own house/flat.
<i>Ethnic capital</i>	
Network effect	The weighted ethnic spatial lag (W_y , refer to section of Model and Estimation method in Essay One).
Ethnic concentration	The lag of proportion of the population of a specific ethnic group to the total population size in a specific region which is assumed to be exogenous in this case.

Note: * These variables are based on the first wave data.

Table 20: Descriptive Statistics of Male Immigrants, Age 20-55, By Country of Origin, LisNZ (Wave 1-3)

	Foreign-Born	Asian	UK & Ireland
Age (mean)	35.9	34	38.7
Years since migration (mean)	6.5	6.3	6.7
Currently married (count)	46%	45%	46%
Proficiency in English (count)	89%	79%	100%
High skilled (count)	33%	44%	33%
Has own house/flat (count)	27%	19%	55%
Has children (count)	37%	30%	40%
Employed (count)	90%	85%	93%
Live in ethnic enclave(s) (count)	48%	60%	17%
Number of Observations	8020	3183	1809

Note: According to Statistics New Zealand Data-lab output requirements, unweighted counts need to be rounded to the nearest 5 for LisNZ data.

The average age of recently approved permanent residents from the UK and Ireland is greater (38.7 years) than the same figure for Asian immigrants. Recently approved permanent residents from Asia are generally younger, with an average age of 34 years. Asian immigrants tend to have migrated more recently and therefore have a shorter duration of New Zealand residency. The mean “years since migration” variable for this group is around 6.3 years, which is lower than the sample average and the figure for UK and Ireland immigrants which is about 6.7 years. Asian immigrants are more likely to have achieved higher education. Therefore, it is reasonable that on average they have lower potential labour market experiences. The rate of owning one’s house/flat for immigrants from the UK and Ireland is the highest (approximately 54%). In comparison, fewer Asian immigrants have their own flat/house in the sample.

Immigrants’ location choices to reside in their primary ethnic enclave(s) are examined in the next section.

4.5. Recent Immigrants' Location Choices: Estimation and Results

In this section, I first examine the effect of ethnic capital on location choices of immigrants; then I discuss how primary ethnic enclaves increase immigrants' access to employment.

I adopt the panel logit model to estimate the effect of ethnic capital, human capital and personal characteristics on immigrants' location choices.⁴⁵ This estimation process is suitable for the data, and it allows us to exploit the panel feature of the data.⁴⁶ According to the study design, I firstly present a traditional model in Table 21 (conventional model (1)) which shows the effects of socio-economic variables⁴⁷ on the location choices of recent male immigrants aged 20 to 55 in New Zealand. Then I provide regression results based on two approaches to modelling the effect of ethnic network in Table 21: conventional modelling approach including ethnic concentration⁴⁸ as the proxy of ethnic network (2), as compared to the specified spatial model (3).

Firstly, a significantly positive coefficient for ethnic network is observed in both the conventional and spatial models (conventional model (2) and spatial model (3)). Regression results confirm that the spatial model offers two advantages when compared to the conventional model: (1) The spatial model provides a better estimation of the impact of human capital and personal characteristics' variables on immigrants' location

⁴⁵ Regional characteristics also have been controlled for. I adopt the random-effects setting; the variation across immigrants is treated as random, and the unobserved effect is also assumed to be uncorrelated with the explanatory variables.

⁴⁶ The selection of estimation method was based on a full consideration of alternative estimation methods. For example, the fixed-effects method commonly used in panel data settings is not suitable in this case, since beside the effects of ethnic capital, it is important to control for the impact of other human capital variables on immigrants' location choices and employment outcomes. In this setting, to avoid endogeneity, the measures of English proficiency, high-skilled, children, marriage, and assets (e.g. own a property) are based on the initial wave interviews, and as such they are time-invariant, making fixed-effects estimation inappropriate. In addition, by following this setting, Wu-Hausman test suggests the random effect model is appropriate in this case.

⁴⁷ As noted earlier, the first survey was conducted six months after new immigrants settled in New Zealand. Therefore, binary variables such as English proficiency, children, marriage, high skilled, and own dwelling in our model are treated as exogenous variables, as they are based on only the first wave's data.

⁴⁸ I use the lagged ethnic concentration variable, and this variable is treated as an exogenous variable.

choices when the network effect is present. By controlling for spatial dependence (spatial model (3)), the estimates of other explanatory variables have been significantly changed. For example, the spatial model suggests an insignificant effect of education (high skilled) rather than a significant effect of that variable. As a result, the conventional models (which do not allow for spatial dependence) tend to either over- or under-estimate the effects of those socio-economic variables when and network effect is present.⁴⁹ (2) A better data fit is offered by the spatial model. The spatial model generates the lowest AIC⁵⁰, which means the spatial model is the preferred approach to model immigrants' location choices. In addition, I have conducted a likelihood test⁵¹ on a vector of constraints equating the spatial model to the conventional model. Test results suggests that the spatial model is significantly different and that it can improve the likelihood of observing the original data as constraints were rejected ($\text{Prob} > \chi^2=0.00$).

As a result, a positive effect of immigrants' ethnic networks on their location choices in primary ethnic enclaves in New Zealand is observed. It indicates that recent immigrants tend to move to a common region rather than being dispersed throughout New Zealand. Empirical evidence in previous New Zealand studies (e.g. Maré et al., 2007) confirms that conclusion. These results on ethnic network also confirm the hypotheses raised by Piore (1979), and Kobrin and Speare (1983) that ethnic networks encourage immigrants to be concentrated spatially.

⁴⁹ More details about this point can be found in the section of Models and Estimation Method in Essay One.

⁵⁰ The AIC, or Akaike Information Criterion, provides a way of measuring a statistical model, in terms of its relative quality, for a specific collection of data. As such, it enables the selection of models. It does not allow for the testing of a model, in terms of investigating a hypothesis. However, it is appropriate when the elements of usefulness/appropriateness versus complexity are taken into consideration. The $AIC = 2k - 2\ln(L)$, where k represents the model's number of parameters, and L represents the ultimate value of the function of the model's likelihood. Adjemian, Lin and Williams (2010) adopt this approach to select the best model for an individual's choice of automobile, when considering conventional and spatial models.

⁵¹ A likelihood ratio test employs statistics to compare the fit of two different models, where one (the null model) represents a particular variation of the other (the alternative model). The test employs the ratio of likelihood, comparing the occurrence of data across the two models.

Secondly, immigrants proficient in English have a lower probability of locating in their primary ethnic enclave in New Zealand. This suggests the hypothesis that with sufficient language skill, immigrants may face fewer barriers to living outside the ethnic enclave. Previous studies (e.g. Scott et al., 2005) have found that with fluency in English, immigrants face fewer difficulties in communicating and in obtaining information about the local labour market. For similar reasons, immigrants who are not proficient in English may face greater barriers outside of the primary ethnic enclaves, when they lack English communication skill to be employed in the mainstream economy.

Thirdly, “years since migration” negatively influence the primary ethnic enclave choices of new immigrants. Therefore, with the experience of each additional year of living in New Zealand, recent immigrants are more likely to locate in other regions with lower levels of ethnic concentration. It seems that primary ethnic enclaves assist new immigrants to adapt to the new environment in New Zealand, as recent immigrants gain sufficient knowledge and prepare to connect with the host community. These empirical observations are consistent with Funkhouser’s (2000) conclusion on “years since migration”.

Furthermore, in Table 22 (which shows the average marginal effects of selected variables), the coefficients of country of origin dummy variables indicate that immigrants from different languages and cultural backgrounds differ in their preferences about locations. The fixed effects coefficients of the UK and Irish immigrants are all negative and significant in both models, which suggest that immigrants from English-speaking countries (e.g. the UK and Ireland) are less likely to locate within a primary ethnic enclave than are immigrants from the rest of world. At the same time, recent immigrants from Asian countries are more likely to locate in their primary ethnic enclave in New

Zealand, when compared to the case of immigrants from the rest of world. Thus, empirical evidence suggests that immigrants from non-English-speaking countries prefer to locate in their ethnic enclave(s) in New Zealand as it can be less problematic for them to live and work within the ethnic enclave. In addition, it will reduce their immediate cost associated with the requirement of learning English for them.

Unmarried immigrants tend to locate in the primary ethnic enclave. As was noted, one of the reasons could be in the expectation that they may be able to explore marriage opportunities within their ethnic group. The coefficients of age are negative in all models. This shows that primary ethnic enclaves in New Zealand are highly attractive to young immigrants, because it is a place where they may access more socio-economic opportunities and resources (such as employment and marriage).

Table 21: Panel Logit Estimates of Choices of Location in Primary Ethnic Enclaves with Network Effect: Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

Odds Ratios

	Conventional		Spatial
	(1)	(2) [^]	(3) ^{^^}
Ethnic Capital			
Network Effect	/	21.57***	32.03***
	/	(0.12)	(0.33)
Human Capital			
High Skilled	-1.36***	0.69***	-0.19
	(0.2)	(0.16)	(0.23)
Personal Characteristics			
Age	-1.16***	-0.42***	-0.49***
	(0.13)	(0.11)	(0.17)
Age-squared	0.01***	0.01***	0.01***
	(0.002)	(0.001)	(0.002)
Years Since Migration (YSM)	-1.05***	-0.74***	-0.43***
	(0.05)	(0.04)	(0.06)
YSM-squared	0.02***	0.02***	0.01***
	(0.001)	(0.001)	(0.002)
Married	-3.37***	-1.76***	-1.40***
	(0.17)	(0.14)	(0.21)
Children	0.08	-0.58***	-0.35
	(0.25)	(0.18)	(0.29)
English Proficiency	-5.91***	-1.4***	-2.77***
	(0.37)	(0.32)	(0.58)
Own Dwelling	-0.88***	2.57***	1.29***
	(0.24)	(0.2)	(0.27)
Country of Origin			
United Kingdom & Ireland	-4.62***	-27.94***	-5.50***
	(0.26)	(0.28)	(0.3)
Asia	4.73***	-8.11***	1.47***
	(0.27)	(0.23)	(0.31)
Observations	8020	8020	8020
Log likelihood	-9717.32	-5926.36	-3038.295
Wald Chi(2)	11999.19	45646.38	10007.36
AIC	19462.64	11882.72	6106.59

Notes: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***p<0.01
 (3) Regional characteristics, and Pacific binary variable are also included.
 (4) For conventional model (2)[^], I adopt the conventional “ethnic concentration” as the proxy of immigrants’ networks.
 (5) For spatial model (3)^{^^}, the “weighted ethnic spatial lag” is derived from individual-level data to capture the effects of social and resource networks for immigrant groups.
 (6) Panel logit random effect estimation.

Table 22: Estimates of Choices of Location in Primary Ethnic Enclaves with Network Effect: (Average Marginal Effects)

	Average Marginal Effects		
	Conventional (1)	(2)	Spatial (3)
Ethnic Capital			
Network Effect	/	0.0171***	1.3436***
	/	(0.0017)	(0.1759)
Human Capital			
Higher Degree	-0.00003***	0.0006***	-0.0078
	(0.00001)	(0.0002)	(0.0093)
Selected Socio-Economic Variables			
Age	-0.00003***	-0.0003***	-0.0207***
	(0)	(0.0001)	(0.0076)
Years Since Migration (YSM)	-0.00003***	-0.0006***	-0.0181***
	(0)	(0.0001)	(0.0035)
Married	-0.0001***	-0.0015***	-0.0589***
	(0.00002)	(0.0002)	(0.0107)
Children	0.000002	-0.0004***	-0.0143
	(0.00001)	(0.0001)	(0.0113)
English Proficiency	-0.0063***	-0.0021**	-0.3278***
	(0.0022)	(0.0009)	(0.1322)
Own Dwelling	-0.00002***	0.0043***	0.0710***
	(0.00001)	(0.0008)	(0.0214)
United Kingdom & Ireland	-0.0002***	-0.9258***	-0.2339***
	(0.00002)	(0.0066)	(0.0281)
Asia	0.0008***	-0.0086***	0.0858***
	(0.0002)	(0.0009)	(0.0273)

Note: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***P<0.01

4.5.1 High Skill vs. Low Skill

Based on the spatial model (third column in Table 21), I have studied the cases for recent high-skilled and low-skilled immigrants. Estimated odds ratios and average marginal effects of selected variables are provided in the following Table 23 and Table 24. The network effect on recent immigrants' location choices in New Zealand is positive for both high-skilled and low-skilled immigrants. Therefore, we find that the ethnic network encourages both recent high-skilled and low-skilled immigrants to locate in their primary ethnic enclaves. Furthermore, as average marginal effects in Table 24 show that the network effect on low-skilled immigrants' location choices is stronger than the same figure for the high-skilled immigrants in New Zealand.

Table 23: Panel Logit Estimates of Choices of Location in Primary Ethnic Enclaves with Network Effect by Skill Level: Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

	Odds Ratios	
	High Skilled	Low Skilled
Ethnic Capital		
Network Effect	38.65*** (0.51)	30.87*** (0.42)
Selected Socio-Economic Variables		
Age	-0.84*** (0.32)	-0.17 (0.19)
Years Since Migration (YSM)	-0.19** (0.1)	-0.47*** (0.08)
English Proficiency	-3.25*** (1.00)	-2.76*** (0.6)
UK & Ireland	-0.30 (0.49)	-7.17*** (0.37)
Asia	2.19*** (0.51)	0.64* (0.38)
Observations	2626	5394
Log likelihood	-1028.71	-2031.80
Wald Chi(2)	6571.08	6139.84

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

Table 24: Estimates of Choices of Location in Primary Ethnic Enclaves with Network Effect by Skill Level: (Average Marginal Effects)

Average Marginal Effects		
	High Skilled	Low Skilled
Ethnic Capital		
Network Effect	0.4485*** (0.0931)	2.4850*** (0.3533)
Selected Socio-Economic Variables		
Age	-0.0097** (0.0041)	-0.0136 (0.0153)
Years Since Migration (YSM)	-0.0022* (0.0012)	-0.0377*** (0.0082)
English Proficiency	-0.2050 (0.1633)	-0.4593*** (0.1473)
UK & Ireland	-0.0034 (0.0053)	-0.5271*** (0.0469)
Asia	0.0379** (0.0160)	0.0595 (0.0411)

Note: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***P<0.01

For recent low-skilled immigrants, there is no significant correlation between their age and their location choices. However, young high-skilled immigrants are more likely to locate in their primary ethnic enclaves. The average marginal effect of years since migration (YSM) is negative and statistically significant in both high-skilled and low-skilled cases. In addition, effects of the years of living experience in New Zealand (YSM) variable has a stronger effect in assisting low-skilled immigrants to locate outside their primary ethnic enclave when compared to high-skilled immigrants. With greater proficiency in English, both low-skilled and high-skilled immigrants may face fewer barriers to employment and choice of where they live. In addition, English language

proficiency has a stronger effect on low-skilled immigrants' location choices when compared to the same effect for high-skilled immigrants.

Lastly, high-skilled Asian immigrants are more likely to conglomerate in their primary ethnic enclave compared to high-skilled immigrants from other countries. Recent low-skilled UK and Irish immigrants are less likely to locate in their primary ethnic enclaves compared to immigrants from the rest of the world. As a result, compared to other regions, this evidence suggests that immigrants' primary ethnic enclaves in New Zealand provide greater socio-economic resources for high-skilled immigrants (especially for high-skilled Asian immigrants). Therefore, recent high-skilled immigrants have a stronger network to encourage them to locate in their primary ethnic enclaves.

4.5.2 Country of Origin and Location Choices

When taking the immigrants' cultural and language backgrounds into consideration, I find that immigrant networks are more influential in the settlement decisions of recent immigrants from English-speaking backgrounds than those with non-English-speaking backgrounds. Table 26 shows the average marginal effect of ethnic network for Asian immigrants is 0.038, which suggests a much stronger network effect on Asian immigrants' location choices, compared to the same effect for UK and Irish immigrants (6.95E-07). A different pattern from Maré et al.'s (2007) study is therefore observed.

Table 25: Panel Logit Estimates of Choices of Location in Primary Ethnic Enclaves with Network Effect by Country of Origin: Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

	Odds Ratios	
	UK & Ireland	Asia
Ethnic Capital		
Network Effect	38.25*** (0.75)	34.83*** (0.54)
Selected Socio-Economic Variables		
Age	-2.34*** (0.49)	0.07 (0.3)
Years Since Migration (YSM)	-0.26** (0.11)	-0.001** (0.004)
Married	-1.66*** (0.50)	-2.54*** (0.42)
English Proficiency	/	-3.3*** (0.65)
Own Dwelling	0.82 (0.51)	0.9 (0.55)
Observations	1809	3183
Log likelihood	-643.00	-774.77
Wald Chi(2)	3438.84	5127.12

Note: (1) Standard errors in parentheses
 (2) * p<0.10 ** p<0.05 *** p<0.01

Table 26: Estimates of Choices of Location in Primary Ethnic Enclaves with Network Effect by Country of Origin: (Average Marginal Effects)

	Average Marginal Effects	
	UK & Ireland	Asia
Ethnic Capital		
Network Effect	6.95E-07*** (0)	0.0384*** (0.009)
Selected Socio-Economic Variables		
Age	-4.28E-08*** (0)	0.0001 (0.00033)
Years Since Migration (YSM)	-4.66E-09*** (0)	-0.0003** (0.0001)
Married	-3.11E-08*** (0)	-0.0043*** (0.0016)
English Proficiency	/	-0.0021*** (0.0006)
Own Dwelling	1.51E-08*** (0)	0.0008* (0.0004)

Note: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***P<0.01

4.6. Primary Ethnic Enclaves and Immigrants' Employment

In this section I examine the effect of ethnic network on immigrants' employment outcomes. Maré et al. (2007) found that, recent migrants' locational decisions were largely influenced by the density of migrant networks in New Zealand. Immigrants were particularly likely to choose to settle in local market areas (LMAs) where earlier immigrants from their same region of birth constituted a large proportion of the local population. However, how significant the effect of immigrants' ethnic network is on the immigrants' labour market integration remained unknown from the previous studies. To address this, I conducted an analysis by using binary panel logit model to investigate the effect of ethnic network on immigrants' employment in New Zealand, and compared these results across skill levels.

Again, I show odds ratios and average marginal effects results from the two approaches to modelling the effect of ethnic network: conventional (1), conventional model with ethnic concentration as the proxy for an ethnic network (2), and spatial model (3) in Table 27. Both approaches show a positive effect of an ethnic network on immigrants' employment. The spatial model is again found to offer a better data fit (lower AIC) and estimate on the effect of all socio-economic variables.

Firstly, the average marginal effect of ethnic network is significantly positive in Table 28, indicating the ethnic network strongly assists recent immigrants' labour market integration in New Zealand. This result also implies that immigrants' labour market performance is not independent of other immigrants, and their employment outcomes are correlated with each other.

Secondly, education plays an essential role in the employment of immigrants in New Zealand. The higher the level of education, the more likely immigrants are to be

employed. Working experience and New Zealand (living) experience (YSM) have significant positive effects on the employment of immigrants. The longer the work experience, the more likely immigrants are to find a job. At the same time, with more years spent in New Zealand, immigrants may be able to grasp local labour market information, and they are more likely to be employed. Married immigrants have a more stable family and living environment than do unmarried immigrants, and they are also more likely to have been employed. The significant positive effect of English language proficiency on immigrants' employment is suggested by the regression results. I will extend the discussion about the effect of English in later case studies. The coefficient of the Asian dummy variable is negative and higher than the coefficient for the UK and Irish dummy in both models listed in Table 28, which means that relative to UK and Irish immigrants and immigrants from the rest of world, Asian immigrants face more difficulties in securing employment in the New Zealand labour market.

Table 27: Panel Logit Estimates of Employment Outcome with Network Effect: Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

Odds Ratios

	<u>Conventional</u>		<u>Spatial</u>
	(1)	(2) ^A	(3) ^{AA}
Ethnic Capital			
Network Effect	/	0.09***	1.4***
	/	(0.03)	(0.16)
Human Capital			
High Skilled	0.44***	0.45***	0.44***
	(0.09)	(0.09)	(0.08)
Personal Characteristics			
Work Experience	0.29***	0.3***	0.28***
	(0.01)	(0.01)	(0.01)
Work Experience-squared	-0.01***	-0.01***	-0.01***
	(0.0004)	(0.004)	(0.0004)
Years Since Migration (YSM)	0.05***	0.05***	0.05***
	(0.02)	(0.02)	(0.02)
YSM-squared	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)
Married	0.66***	0.65***	0.64***
	(0.06)	(0.06)	(0.06)
Children	-0.54***	-0.55***	-0.56***
	(0.1)	(0.1)	(0.1)
English Proficiency	0.58***	0.6***	0.53***
	(0.11)	(0.11)	(0.1)
Own Dwelling	0.21***	0.22**	0.22**
	(0.1)	(0.1)	(0.1)
Country of Origin			
UK & Ireland	-0.15***	-0.22**	-0.20*
	(0.11)	(0.12)	(0.11)
Asia	-1.55***	-1.61***	-1.44***
	(0.11)	(0.11)	(0.11)
Observations	8020	8020	8020
Log likelihood	-10651.09	-10646.63	-10620.06
Wald Chi(2)	965.29	976.60	1103.36
AIC	21326.18	21319.26	21266.12

Notes: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***p<0.01
 (3) Pacific binary variable is also included.
 (4) For conventional model (2)^A, I adopt the conventional “ethnic concentration” as the proxy of immigrants’ networks.
 (5) For spatial model (3)^{AA}, the “weighted ethnic spatial lag” is derived from individual-level data to capture the effects of social and resource networks for immigrant groups.

Table 28: Estimates of Employment Outcome with Network Effect: (Average Marginal Effects)

	Average Marginal Effects		
	Conventional (1)	(2)	Spatial (3)
Ethnic Capital			
Network Effect	/	0.0010***	0.0180***
	/	(0.0003)	(0.0026)
Human Capital			
High Skilled	0.0046***	-0.0026***	0.0053***
	(0.0009)	(0.0014)	(0.0010)
Selected Personal Characteristics			
Work Experience	0.0033***	0.0034***	0.0037***
	(0.0003)	(0.0003)	(0.0003)
Years Since Migration (YSM)	0.0005***	0.0005***	0.0007***
	(0.0002)	(0.0002)	(0.0002)
Married	0.0073***	0.0073***	0.0081***
	(0.0008)	(0.0008)	(0.0009)
Children	-0.0066***	-0.0068***	-0.0078***
	(0.0013)	(0.0013)	(0.0015)
English Proficiency	0.0084***	0.0087***	0.0085***
	(0.0021)	(0.0021)	(0.0022)
Own Dwelling	0.0023**	0.0024**	0.0027***
	(0.001)	(0.0010)	(0.0011)
Country of Origin			
UK & Ireland	-0.0017	-0.0026*	0.0053*
	(0.0014)	(0.0014)	(0.0010)
Asia	-0.0260***	-0.0278***	-0.0266***
	(0.0029)	(0.0031)	(0.0029)

Note: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***P<0.01

4.6.1 High Skill vs. Low Skill: Employment Effects

In this section, I compare the effect of an ethnic network on employment for immigrants by skill level and living inside or outside of their primary ethnic enclaves. In general, the ethnic network plays a positive role in immigrants' labour market integration. Importantly, Table 30 confirms that immigrants have a stronger ethnic network effect for their employment within their primary ethnic enclaves than they have in other New Zealand regions.

Within immigrants' primary ethnic enclaves, the network effect on employment is stronger for high-skilled immigrants than it is for low-skilled immigrants. As such, for immigrants living in other regions, low-skilled workers may face greater barriers to finding employment compared to high-skilled immigrants, and they may be more reliant on ethnic capital to gain employment.

The average marginal effect of ethnic network for low-skilled immigrants living outside their primary ethnic enclaves is higher than it is for the high-skilled immigrants. This result confirms the hypothesis of ethnic capital. The biggest employment effect is for high-skilled immigrants in their primary ethnic enclaves. Likewise, the coefficient of English language proficiency is not statistically significant for low-skilled immigrants when they are living inside primary ethnic enclaves.

Work experience, years since migration, and proficiency in English play important roles in immigrants' employment in New Zealand. Within the primary ethnic enclaves, work experience and years since migration are both positive and significant in all cases. However, we do not observe any significant effects of year since migration on immigrants living outside the primary ethnic enclaves.

Proficiency in English language is more important for low skilled immigrants living outside the primary ethnic enclaves than it is for immigrants living in primary ethnic enclaves. English proficiency increases the propensity of employment for both low-skilled and high-skilled immigrants who live outside their primary ethnic enclaves.

For the case of immigrants living in their primary ethnic enclaves, the significant positive effect of English language proficiency is observed only in the case of high-skilled immigrants. However, it is not significant in the case of low-skilled immigrants. Because of the disadvantages of poor communication skills and a lower educational or skill level, it is very hard for low-skilled immigrants with limited English proficiency to find a job. Therefore, this result indicates that primary ethnic enclaves may lower the English language requirement for low-skilled immigrants by providing greater job opportunities from immigrant-owned businesses.

Lastly, both high-skilled and low-skilled Asian immigrants are found to be less likely to be employed than other immigrants, no matter whether they are located within or outside their ethnic enclave.

Table 29: Panel Logit Estimates of Employment Outcome with Network Effect by Skill Levels: Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

Odds Ratios

	Inside Primary Ethnic Enclave			Outside Primary Ethnic Enclave		
	Pooled	High Skilled	Low Skilled	Pooled	High Skilled	Low Skilled
Ethnic Capital						
Network Effect	2.97*** (0.40)	7.53*** (0.76)	1.09** (0.50)	1.26*** (0.18)	1.28*** (0.30)	1.49*** (0.22)
Selected Socio-Economic Variables						
Work Experience	0.35*** (0.02)	0.46*** (0.06)	0.36*** (0.03)	0.21*** (0.02)	0.003 (0.04)	0.28*** (0.02)
Years Since Migration (YSM)	0.17*** (0.03)	0.27*** (0.05)	0.21*** (0.04)	-0.02 (0.02)	0.02 (0.05)	-0.02 (0.03)
English Proficiency	0.31** (0.13)	1.27*** (0.30)	0.17 (0.15)	0.92*** (0.20)	0.90** (0.42)	0.73*** (0.22)
UK & Ireland	0.35 (0.24)	-0.72* (0.41)	0.45 (0.33)	-0.21 (0.13)	-0.14 (0.23)	-0.35** (0.15)
Asia	-1.40*** (0.17)	-1.57*** (0.29)	-1.78*** (0.22)	-1.47*** (0.15)	-1.59*** (0.27)	-1.77*** (0.23)
Observations	3867	1122	2745	4153	1504	2649
Log likelihood	-4925.35	-1308.81	-3532.70	-5626.53	-1795.07	-3819.53
Wald Chi(2)	646.85	192.83	447.25	515.22	137.93	446.04

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

Table 30: Estimates of Employment Outcome with Network Effect by Skill Levels: (Average Marginal Effects)

Average Marginal Effects

	<u>Inside Primary Ethnic Enclave</u>			<u>Outside Primary Ethnic Enclave</u>		
	Pooled	High Skilled	Low Skilled	Pooled	High Skilled	Low Skilled
Ethnic Capital						
Network Effect	0.0447*** (0.0085)	0.0928*** (0.0207)	0.0131** (0.0067)	0.0141*** (0.0026)	0.0112*** (0.0039)	0.0202*** (0.0040)
Selected Socio-Economic Variables						
Work Experience	0.0052*** (0.0006)	0.0056*** (0.0011)	0.0044*** (0.0006)	0.0023*** (0.0003)	0.00003 (0.0004)	0.0038*** (0.0005)
Years Since Migration (YSM)	0.0025*** (0.0005)	0.0033*** (0.0009)	0.0025*** (0.0006)	-0.0002 (0.0003)	0.0002 (0.0004)	-0.0003 (0.0004)
English Proficiency	0.0052*** (0.0024)	0.0285** (0.0120)	0.0022 (0.0020)	0.0161*** (0.0053)	0.0123 (0.0092)	0.0140** (0.0059)
UK & Ireland	0.0047 0.0029	-0.0112 (0.0081)	0.0047 (0.0029)	-0.0023 (0.0014)	-0.0012 (0.0021)	-0.0048** (0.0021)
Asia	-0.0247 (0.0038)	-0.0189*** (0.0049)	-0.0301*** (0.0054)	-0.0276*** (0.0044)	-0.0216*** (0.0057)	-0.0487*** (0.0088)

Note: (1) Standard errors in parentheses
 (2) * p<0.10 ** p<0.05 *** p<0.01

4.6.2 Country of Origin and Employment Effect

In this section, I compare the impact of networks on employment outcomes for immigrants. I also discuss results for immigrants living in and outside of their primary ethnic enclaves. Table 31 shows the odds ratios and Table 32 shows the average marginal effects. Table 32 shows that compared to immigrants from traditional source countries, Asian immigrants are more dependent on their ethnic network to obtain employment opportunities. Asian immigrants may have less knowledge about the New Zealand labour market. So they may be more reliant on their ethnic network to enhance access to job opportunities.

Moreover, primary ethnic enclave is important for Asian immigrants' labour market integration in New Zealand. For example, the primary ethnic enclave provides a stronger ethnic network to help immigrants from Asian countries to find a job, compared to the effect of ethnic network on Asian immigrants located in other regions. Within the primary ethnic enclave, Asian immigrants can better utilise their work experience and their experience of living in New Zealand to find a job. In addition, when ethnic network is controlled for, the correlation of proficiency in English is not significant in the case of Asian immigrants located in the primary enclave, confirming the earlier hypotheses that Asian immigrants located in the primary enclave may not rely greatly on proficiency in the English language to find a job. However, once Asian immigrants move outside their primary ethnic enclave, proficiency in English language plays a vital role in their employability. As a result, the primary ethnic enclave decreases the immediate cost of learning the host country's language. It further provides an environment for Asian immigrants to better utilise skills and experiences; and it generates a stronger network to

assist Asian immigrants' labour market integration in New Zealand. These results are confirmed in Table 32.

We cannot observe the same pattern for recent immigrants from the UK and Ireland as for Asian immigrants. The effects of an ethnic network for UK and Irish immigrants are insignificant whether the immigrants are located within or outside of their primary ethnic enclaves. As the UK and New Zealand share similar cultural, language, and market backgrounds; therefore, one can argue that UK and Irish immigrants are less dependent on their ethnic network to receive information on job opportunities. As a result, one can conclude that primary ethnic enclaves in New Zealand are significantly more important for immigrants from non-English-speaking countries, than they are for immigrants from English-speaking countries because they provide a stronger network, greater socio-economic resources and greater opportunities for immigrants to be employed compared to the main stream economy.

Table 31: Panel Logit Estimates of Employment Outcome with Network Effect by Country of Origin: Male Immigrants, Age 20-55, LisNZ (Wave 1-3)

	Odds Ratios					
	Inside Primary Ethnic Enclave			Outside Primary Ethnic Enclave		
	General	UK & Ireland	Asia	General	UK & Ireland	Asia
Ethnic Capital						
Network Effect	2.97*** (0.40)	-10.69 (10.31)	7.92*** (0.68)	1.26*** (0.18)	-0.06 (0.38)	2.06*** (0.27)
Selected Socio-Economic Variables						
High Skilled	0.49*** (0.13)	-1.44*** (0.55)	0.37*** (0.13)	0.42*** (0.11)	0.10 (0.18)	0.71*** (0.16)
Work Experience	0.35*** (0.02)	-0.13 (0.13)	0.28*** (0.03)	0.21*** (0.02)	0.08*** (0.04)	0.17*** (0.03)
Years Since Migration (YSM)	0.17*** (0.03)	0.10 (0.09)	0.41*** (0.06)	-0.02 (0.02)	0.03 (0.04)	0.11** (0.05)
English Proficiency	0.31** (0.13)	/	-0.01 (0.15)	0.92*** (0.20)	/	0.77*** (0.21)
Observations	3867	313	1809	4153	1496	1284
Log likelihood	-4925.35	-317.04	-2829.88	-5626.53	-2462.75	-1550.9
Wald Chi(2)	646.85	36.51	356.18	515.22	196.04	190.38

Note: (1) Standard errors in parentheses
 (2) * p<0.10 ** p<0.05 *** p<0.01

Table 32: Estimates of Employment Outcome with Network Effect by Skill Levels: (Average Marginal Effects)

Average Marginal Effects

	<u>Inside Primary Ethnic Enclave</u>			<u>Outside Primary Ethnic Enclave</u>		
	General	UK & Ireland	Asia	General	UK & Ireland	Asia
Ethnic Capital						
Network Effect	0.0447*** (0.0085)	-0.0130 (0.0133)	0.4361*** (0.0484)	0.0141*** (0.0026)	-0.0003 (0.0023)	0.0973*** (0.0171)
Selected Key Socio-Economic Variables						
High Skilled	0.0067*** (0.0017)	-0.0022 (0.0016)	0.0196*** (0.0070)	0.0044*** (0.0011)	0.0006 (0.0011)	0.0336*** (0.0082)
Work Experience	0.0052*** (0.0006)	-0.0002 (0.0002)	0.0153*** (0.0016)	0.0023*** (0.0003)	0.0005** (0.0002)	0.0078*** (0.0016)
Years Since Migration (YSM)	0.0025*** (0.0005)	0.0001 (0.0001)	0.0228*** (0.0035)	-0.0002 (0.0003)	0.0002 (0.0002)	0.0050** (0.0022)
English Proficiency	0.0052*** (0.0024)	/	-0.0006 (0.0082)	0.0161*** (0.0053)	/	0.0474*** (0.0175)

Note: (1) Standard error in parentheses
 (2) *p<0.10 **p<0.05 ***P<0.01

4.7. Summary

In this essay, I focused on the importance of the networks and resources provided by the ethnic enclave(s) in immigrants' location choices and employment in the host country context.

Previous studies generally adopt either ethnic concentration or linguistic concentration as the proxy for immigrants' network in the host country. In this essay, I adopted a new approach to construct a representation of the strength and quality of immigrants' network of socio-economic resources based on individual level data. I incorporated a spatial autoregressive matrix approach to location choices and employment opportunities of immigrants from similar ethnic and linguistic backgrounds, and utilised a new and rich longitudinal data set of new immigrants through their settlement and employment experiences. This approach enables researchers to relax the strong assumption that choices of immigrants are independent of decisions by other immigrants, thereby providing a more realistic framework for the analysis of immigrant labour market outcomes. Also importantly, this approach makes it possible to account for the quality of resources offered by ethnic concentration in explaining why certain immigrant groups may perform better than others in the host country labour market. As such, the approach employed in this essay addresses the potential bias from omission of network effects.

Results were presented on both location choices and employment outcomes across immigrant groups by country of origin. These results confirm that the approach offered here provides improved analytical performance over conventional models.

Since immigrant's location choices correlate to their job opportunities and expected income levels, their settlement choices have a potentially significant impact on

their economic assimilation process in the host country through employment outcomes. In this process, a larger ethnic enclave enhances new immigrants' feelings of security, solidarity, and identity within the immigrant group, and assists them in adapting to the new environment in the host country. I incorporated this spatial ethnic network effect in our modelling approach, and hypothesised that immigrants are likely to choose a location to maximize their utilization of social and ethnic capital to help them achieve a better labour market performance in the host country.

The empirical evidence based on Maximum Likelihood Random Effect Panel Logit models and individual level longitudinal data confirms that ethnic networks play a vital role in immigrants' location choices and their employment outcomes. The results further show that the models which do not allow for ethnic network may under- or over-estimate the effects of other socio-economic variables. In addition, these results highlight that through location choices immigrants enhance their employment opportunities in achieving greater economic opportunities and transitioning integration in the host country. I find strong evidence that ethnic networks influence immigrants' location choices to concentrate in the host country.

In addition, this analysis shows that cultural and language distance to that of the host country is a key factor for recent immigrants' location decisions. For example in our analysis, for immigrants from the UK and Ireland, who share a similar cultural background to the host-country population, the ethnic network effect to locate in a primary ethnic enclave is weak. In contrast, recent immigrants from Asian countries are more likely to locate in their primary ethnic enclave, supporting the hypothesis of greater returns to spatial networks when cultural and language distance is greater. The results also verify that for this group of immigrants living in their primary ethnic enclave leads to

significantly enhanced employment outcomes, whereas for immigrants from the UK and Ireland the employment gain is not present.

In summary, this study shows compelling empirical evidence based on an improved data set and modelling approach that primary ethnic enclaves significantly influence immigrants' labour market integration in the host country, through positive employment outcomes. This less studied economic impact of immigrant location choices has significance for research and policy as to how ethnic enclaves are viewed.

Chapter 5. Summary

This research adopts “ethnic capital” as a key concept for examining immigrants’ labour market performance in New Zealand, and it thereby fills a gap in the literature. New immigrants may face some disadvantages in finding a job in New Zealand. However, ethnic capital is hypothesised to help immigrants to overcome those disadvantages to some extent. This research has introduced a new ethnic spatial network approach to incorporating the effects of ethnic capital on immigrant economic assimilation. The approach adopted extends the international literature on immigrant assimilation effects.

5.1. Essay One: Ethnic Capital and the Earnings of Immigrants

Essay One examined the question of immigrant economic ‘assimilation’ in New Zealand, by focusing on the earnings of immigrants relative to the native-born earnings.

Data from the 2006 New Zealand Census (Statistics New Zealand, 2006a), shows that about 22.9% of the population usually resident in New Zealand was foreign born. In addition, the Asian workforce makes up around 8.3% of New Zealand’s total labour force, which is the third largest source of labour for New Zealand.

During the period 2001 to 2006, the Asian population in New Zealand almost doubled. Following the United Kingdom (UK), China had become the second largest source of immigrants for New Zealand in 2006. The rapid increase in the number of immigrants who come from non-English speaking countries has changed the language

background and fluency composition for New Zealand (e.g. about 2% of the New Zealand population reports Chinese as their first language). Furthermore, 80.3% of usual residents who cannot speak English are immigrants. Previous studies have discovered that Asian immigrants in New Zealand have substantial income disadvantages, in comparison with natives and immigrants from some English-speaking countries such as Australia and the UK.

Generally speaking, ethnic enclaves help new immigrants to settle down and find employment in the host country. The concept of ethnic capital recognises that individuals are mutually linked under various conditions. These conditions include friendship, kinship, business relationships, as well as ethnic and social relationships. Indeed experiences, knowledge, information and other factors are produced and shared with each other through these kinds of networks. Essay One adopted a new modelling approach which recognises these effects within an ethnic-spatial economic framework. This is a contribution of this essay which enhances the analytical framework for immigrant assimilation effects. Individuals' labour market performance is hypothesised not to be independent and identically distributed (*i.i.d.*), especially for immigrants. Thus, from a modelling point of view this approach provides a more realistic framework when individuals' labour market performance is allowed to be correlated with each other to some extent.

Recent international studies have observed both positive (e.g. Edin et al., 2003) and negative (e.g. Chiswick & Miller, 2002b) effects of ethnic concentration. On the one hand, ethnic concentration increases the employment possibilities for immigrants, as more jobs could be generated by ethnic and geographic concentration. However, on the other hand, by lowering barriers to employment for immigrants such as reducing the

requirement of learning English within the ethnic enclave, ethnic concentration can reduce the bargaining power of low-skilled immigrants by making employment within the ethnic enclave very attractive. As a result, the effect of ethnic concentration on immigrants' assimilation is an empirical question and it might vary by ethnic group. Notably, immigrants can be either "complements" or "substitutes" to each other in the host country labour market. Thus, under competition, immigrants may accept a lower salary than they would prefer in order to secure the employment opportunity. In the opposite case, with an increasing proportion of immigrants in a specific region, a higher demand for immigrant labour would be generated, leading to more job opportunities and a higher salary for immigrants.

The core objective of Essay One is to clarify the effect of ethnic capital on immigrants' income and the assimilation effect for different ethnic and skill groups of immigrants in New Zealand. In this essay, the hypotheses based on ethnic capital for immigrant assimilation processes are examined by using the New Zealand Income Survey (NZIS) data set over a ten-year period (2001 to 2010).

Essay One incorporated alternative measures of ethnic capital, in particular the new spatial ethnic network matrix through regression analysis. A significantly positive ethnic network effect is observed throughout the results. A series of econometric results confirms that the spatial model adopted offers three advantages when compared to the conventional model: (1) The spatial model provides a better estimation of the impact of human capital and personal characteristic variables on immigrants' assimilation processes when the network effect is present. (2) A better data fit is offered by the spatial model. (3) It captures more accurately the effect of networks.

The evidence in this essay suggests that immigrants share social capital and economic resources through their ethnic networks in New Zealand. Therefore, their labour market performance is positively and significantly correlated with others within the ethnic spatial immigrant group. It is also a notable finding that the network has a stronger impact on the natives compared to the immigrants in New Zealand. This implies that the transformation and transmission of the human capital among the immigrants does not result in labour market outcome as strongly as in the case of the natives as far as New Zealand is concerned. It suggests that immigrants may require a stronger social network to achieve economic assimilation. The results of this essay pointed to the importance of the role of ethnic capital in immigrants' assimilation processes.

5.2. Essay Two: Ethnic Capital and Immigrant Entrepreneurship

Essay Two analysed the effect of ethnic capital on immigrants' self-employment decisions. New Zealand has a considerable population of self-employed immigrants. The 2006 Census (Statistics New Zealand, 2007) shows that about 14% of immigrants were self-employed. The self-employment ratio in New Zealand, this rate is higher than the rate in other traditional immigrant-receiving countries (e.g. 10.4% in Canada and 7.3% in the United States (US) (Organisation for Economic Co-operation and Development, 2001)).

Generally speaking, there are two forms of employment: either a job in the wage/salary sector or self-employment. The requirement for self-employment is much higher than finding a job in the wage/salary sector due to capital and information

requirements. Compared with natives, immigrants from another language and cultural background are potentially disadvantaged when attempting to set up a business in a host country. Following their initial settlement, some immigrants traditionally find a job within their ethnic enclaves. This effect is especially prevalent among immigrants with lower language fluency.

In this essay, I examined the effect of ethnic spatial networks on self-employment decision of recent immigrants. Ethnic enclaves can impact entrepreneurship of immigrants by through at least two channels. Firstly, the immigrant market can act as a “protected market” because immigrants have a specific demand for ethnic goods and services (e.g. Aldrich et al., 1985; Boyd, 1990). Immigrant entrepreneurs are, for example, more efficient in serving this kind of ethnic-oriented demand for immigrants from the same ethnic group, as they know other immigrants’ (from the same ethnic group) demand, culture, norms, and customs better than local businesses. As such, with a high ethnic concentration level more business opportunities can be generated for potential immigrant entrepreneurs from the “protected market”.

Secondly, ethnic networks link immigrants and they work as a platform to distribute economic resources. Lofstrom (2002), and Van Auken and Neeley (1998) claimed that the ethnic network helps immigrants to obtain sufficient start-up financial capital and necessary management skills. Bond and Townsend (1996) observed that the ethnic network worked as an informal, instead of formal, financial sector to provide funds for Hispanic immigrant entrepreneurs in the US. The ethnic network not only provides funds to potential immigrant entrepreneurs, but it also provides support through culture and tradition.

In addition, the ethnic network promotes business communication and development for immigrant-owned businesses within the ethnic enclave. For example, when Wilson and Martin (1982) examined the case for America, they found that Cuban-owned firms were most likely to have Cuban suppliers; Raijiman and Tienda (2005) found that in America Korean-owned companies preferred to do business with companies owned by other ethnic groups (such as Mexican companies).

As a result, ethnic capital is an important but less studied factor that can importantly influence immigrants to become self-employed. In Essay Two, I examine the hypothesis based on ethnic capital for immigrant entrepreneurs based on the three-year Longitudinal Immigration Survey: New Zealand (LisNZ) data set. This new and rich data set allows a comprehensive examination of hypotheses based on longitudinal micro level data, by incorporating the ethnic spatial network approach for the first time.

The analysis in Essay Two strongly suggests that an ethnic network promotes self-employment among recent immigrants to New Zealand. It implies immigrants may share socio-economic resources through their ethnic network and may help each other to be self-employed.

Econometric results confirm that the conventional approach for estimating the network effect may fail to capture the real effect of immigrants' networks. I also find that, conventional models tend to either under- or over-estimate the effect of other socio-economic variables when the network effect is absent. Essay Two further showed that, by adopting the ethnic spatial network approach to construct immigrants' ethnic networks, the effectiveness of self-employment models can be enhanced.

5.3. Essay Three: Ethnic Capital and Immigrants' Location Choices

Essay Three focused on recent immigrants' location choices in New Zealand. Because immigrants' location choices correlate to job opportunities, immigrant location choices are important indicators. Non-English speaking immigrants, for example, may benefit from ethnic capital and face fewer barriers in finding a job than might be expected by settling where greater ethnic networks and resources are available. Therefore, location is important for immigrants. The size and quality of social and ethnic capital that immigrants can access varies across regions. Immigrants tend to locate in a place where it might be easier to access social and ethnic resources.

Low-skilled immigrants may more heavily rely on ethnic capital and choose a large ethnic enclave to settle in since there will be more job opportunities for them within the ethnic enclave. This is a hypothesis that this essay explores. In addition, immigrants with less English proficiency may benefit from locations within an ethnic enclave compared to their counterparts. Previous studies (e.g. Scott et al., 2005) have indicated that with fluency in English, immigrants face fewer difficulties in communicating and obtaining information on the local labour market. In addition, with greater time in the host country, immigrants may be more experienced in utilising resources (such as services, facilities etc.) provided by the local community and more confident to locate outside primary ethnic enclave(s).

Essay Three provided a test of these hypotheses by using three years' Longitudinal Immigration Survey: New Zealand (LisNZ) data, and empirical evidence across New Zealand.

In this essay, based on calculations of residential concentration quotient (RCQ), I define "primary" ethnic enclaves for immigrants in New Zealand (e.g. Auckland region is

the primary ethnic enclave for Asian immigrants). I have used immigrant location choices to verify the effect of ethnic spatial networks on their employment successful outcomes within and outside primary ethnic enclave(s).

By adopting the ethnic spatial-ethnic autoregressive network approach, to construct ethnic networks, the effectiveness of the location choices model is largely enhanced. The empirical evidence derived from this study suggests that ethnic networks play an important role in immigrant location choices.

All of the regressions suggest that education, time spent in the host country, work experience, and marital status have a negative correlation with the location choices of the recent immigrants in within their primary ethnic enclave(s). This confirms that recent immigrants with skills, experience and adequate information must face fewer barriers in living outside of their primary ethnic enclaves.

Cultural differences also play an important role in the decisions of the immigrants. Immigrants from the UK and Ireland, who share a similar language and culture to New Zealanders, tend to locate in other New Zealand regions rather than their primary ethnic enclaves. In contrast, recent immigrants from Asian countries are more likely to choose to locate in primary ethnic enclaves in New Zealand.

This analysis sheds new light on immigrant employment outcomes. Results conclusively support the significant effect of ethnic capital on immigrants' location choices and employment outcomes. The results show supporting evidence that primary ethnic enclave(s) play a vital role in recent immigrants' economic success in New Zealand. Finally, these results have significant implications for how ethnic enclaves are considered in research design and immigrant settlement policies.

Chapter 6. Conclusion

Recent studies show that social networks may exert a significant influence on people's labour market performance (see Frijters, et al., 2005). According to the ethnic network hypotheses raised by Piore (1979), Kobrin and Speare (1983), ethnic networks assist new immigrants to adjust to the new environment in the host country, enhancing new immigrants' feelings of security, solidarity, and identity within the ethnic group. In addition, social networks are argued to be "the most profitable avenue of job search" for immigrants (Frijters et al., 2005). For these reasons, individuals' labour market performance may not be independent and identically distributed (*i.i.d.*), especially for immigrants. Thus, the labour market performance of an individual is geographically and ethnically correlated with that of other individuals to some extent. For example, by choosing a specific location, immigrants may benefit from ethnic capital and face fewer barriers in finding a job.

Previous international studies adopt either ethnic concentration or language as a proxy for immigrants' network in the host country (e.g. Chiswick & Miller, 1996). In contrast to these studies, I adopt the 'ethnic spatial network approach' to account for ethnic concentration and networks in order to capture the effects of social and resource networks for immigrant groups. I incorporate different measures of ethnic capital, in particular, ethnic group economic resources and spatial-ethnic concentration.

The spatial model has often been used in studies in research on housing location and choice of automobile (e.g. Adjemian, et al., 2010). This study is a trial of adopting this approach in relation to the labour market by New Zealand data. In this study, the "Spatial-Lag Matrix" is constructed with micro data, which is based on the three

conditions of 1) ethnic group, 2) region of residence, and 3) year of survey. This modelling approach investigates the immigrants' network effect through the data. Regression results confirm that the conventional approach for estimating the network effect may fail to capture the real effect of immigrants' networks. I also find that, conventional models tend to either under- or over-estimate the effect of other socio-economic variables when the network effect is not accounted for. Likewise, a better data fit is offered by the spatial model.

The results of this study suggest that, in determining contemporary immigration research and policy, much greater attention is warranted to be given to the role of ethnic capital in influencing the assimilation process of immigrants. This is evidenced through the examination of earnings, employment opportunities, and location choices, throughout this study.

Previous immigration studies, conducted in New Zealand and internationally, have observed the impact of ethnicity on the economic integration of immigrants. This study based on a ten year study, employing the New Zealand Income Survey (NZIS) and the three waves – approximately three years – of the Longitudinal Immigrant Survey New Zealand (LisNZ) enhanced previous findings. I find that, overall, immigrants earn significantly lower earnings than the New Zealand native-born. For Asian immigrants, this initial disparity is particularly marked, and economic assimilation is estimated to occur over a prolonged period. In contrast, immigrants from the UK and Ireland start off closer to the New Zealand native born, and assimilate quickly.

The ethnic network of any given group of immigrants significantly assists successful assimilation. An ethnic network has a positive impact on labour market performance, tending to increase employment levels – including self-employment – and

wages. In comparison with immigrants from the UK and Ireland, those from Asia benefit from ethnic network but they have less access to strong ethnic networks. Hence, Asian immigrants need assistance in establishing connections.

This study revealed a clear, positive correlation between immigrants' ethnic networks, in terms of the characteristics of their primary ethnic enclave, and their location choices. In New Zealand, ethnic networks promote the concentration of immigrants in certain areas ("primary ethnic enclave"). The empirical evidence in this study confirms that, for immigrants from non-English speaking backgrounds, the existence of immigrant networks is more influential in geographical decisions than it is for immigrants from English-speaking backgrounds.

Primary ethnic enclaves play a vital role in immigrants' labour market integration in New Zealand. One of the reasons for this contrast is that immigrants originating from non-traditional source nations, particularly those whose linguistic and cultural background differs significantly to that of New Zealand, tend to become reliant on the socio-economic resources generated by their primary ethnic enclave. This is true of both low-skilled and highly-skilled immigrants. However, the effect is far more significant for the low-skilled group.

Furthermore, proficiency in the English language is highly beneficial when it comes to the labour market integration of immigrants. Those with proficiency in English are far more likely to be employed. Simultaneously, the existence of primary ethnic enclaves tends to offset English requirements for low-skilled immigrants from a non-English speaking background.

Finally, the results of this study strongly suggest greater attention should be given to the role of ethnic capital and immigrant networks in research design and policy on the economic assimilation process of immigrants.

Appendix A

In Essay Two and Three, I have used the Likelihood Ratio (LR) Test and the Akaike Information Criterion (AIC) test for model selection. In this section, I firstly provide a brief definition for the LR test and the AIC test. Then I present the tests results used in essays Two and Three to show that the ethnic-spatial network model is preferred in modelling immigrants' self-employment decision and location choices.

Likelihood Ratio (LR) Test

A likelihood ratio test employs statistics to compare the fit of two different models, where one (the null model) represents a particular variation of the other (the alternative model). The general idea is dropping variables normally leads to a smaller log-likelihood as the maximum likelihood estimation (MLE) maximizes the log-likelihood functions. We are interested in whether or not the decrease of log-likelihood is significant enough to conclude that the dropped variables are important. Thus, the null hypothesis suggests us that those dropped variables are not important.

The test employs the ratio of likelihood, comparing the occurrence of data across the two models.

$$LR = -2 \log_e \left(\frac{\mathcal{L}_s(\hat{\theta})}{\mathcal{L}_g(\hat{\theta})} \right) \quad (\text{A-1})$$

where $\mathcal{L}_s(\hat{\theta})$ is the likelihood function of the simpler model (s) that has fewer parameters than the general model (g). The simpler model (s) is treated as a special case of the general model (g). Therefore, it is the ratio of two likelihood functions. Asymptotically, the test statistic is distributed like a chi-squared random variable. The

degree of freedom is equal to the number of parameters of the general model (g) minus the number of parameters of the simple model (s). Recall that $\log(A/B)=\log(A)-\log(B)$, so LR can be shown as a difference in the log-likelihood and also can be represented in term of deviance:

$$\begin{aligned}
 LR &= -2\log_e\left(\frac{\mathcal{L}_s(\hat{\theta})}{\mathcal{L}_g(\hat{\theta})}\right) \\
 &= -2\left(\log_e(\mathcal{L}_s) - \log_e(\mathcal{L}_g)\right) \\
 &= \textit{deviance}_s - \textit{deviance}_g
 \end{aligned}
 \tag{A-2}$$

Therefore, the LR can be obtained from the difference in the deviance of the two models. Under the null hypothesis, the likelihood ratio is following an approximate chi-square distribution.

In the following, the ethnic spatial lag (“network effect” variable) will be tested by the self-employment and location choices model separately.

AIC Test

The AIC, or Akaike Information Criterion, provides a way of evaluating a statistical model in terms of its relative quality for a specific collection of data. As such, it enables the selection of models. It does not allow for the testing of a model, in terms of investigating a hypothesis. However, it is appropriate when the elements of usefulness/appropriateness versus complexity are taken into consideration. The $AIC = 2k - 2\ln(L)$, where k represents the model’s number of parameters, and L represents the ultimate value of the function of the model’s likelihood. Adjemian, et al. (2010) adopt this approach to select the best model for an individual’s transport choice when considering conventional and spatial models.

Test Results

(1) *The LR test and the AIC test used in Essay Two*

The following tables show the test results for the LR test and the AIC test used in selecting the model for immigrants' self-employment decisions in Essay Two (refer to section 3.7.1).

Table A-1: Conventional vs. Spatial Model: Evidence from Immigrants' Self-employment Decisions

	Odds Ratios	
	Conventional	Spatial
Ethnic Capital		
Network Effect	/	2.39***
	/	(0.23)
Ethnic Concentration Effect	/	/
	/	/
Human Capital		
Experience	0.30***	0.30***
	(0.03)	(0.02)
Experience -squared	-0.005***	-0.01***
	(0.001)	(0.001)
Self-employment Experience (origin)	0.20***	0.20***
	(0.02)	(0.02)
Self-employment Experience-squared (origin)	-0.01***	-0.01***
	(0.001)	(0.001)
High Skilled	-0.12	-0.18*
	(0.1)	(0.09)
English Proficiency	-2.16***	-2.00***
	(0.13)	(0.13)
Manager & Professional	1.61***	1.52***
	(0.1)	(0.1)
Personal Characteristics		
Years Since Migration (YSM)	0.42***	0.38***
	(0.03)	(0.02)
YSM-squared	-0.01***	-0.01***
	(0.001)	(0.001)
Married	0.66***	0.64***
	(0.07)	(0.07)
Children	-0.42***	-0.43***

	(0.1)	(0.1)
Own Dwelling	0.33***	0.26***
	(0.1)	(0.09)
Observations	6735	6735
Log likelihood	-11635.10	-11596.59
Wald Chi2	1268.03	1360.31
AIC	23294.20	23219.18
Wald Chi2(1)		111.53
LR Chi2(1)		77.04
	(Prob>Chi2=0.0000)	

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

In the following table A-2, I have also included the variable of ethnic concentration into the spatial model in order to check whether the two ethnic capital variables (ethnic network and ethnic concentration) are jointly significant.

Table A-2: Conventional vs. Spatial Model: Evidence from Immigrants' Self-employment Decisions

	Odds Ratios	
	Conventional	Spatial
Ethnic Capital		
Network Effect	/	2.39***
	/	(0.23)
Ethnic Concentration Effect	/	-0.01
	/	(0.06)
Human Capital		
Experience	0.30***	0.30***
	(0.03)	(0.02)
Experience -squared	-0.005***	-0.01***
	(0.001)	(0.001)
Self-employment Experience (origin)	0.20***	0.20***
	(0.02)	(0.02)
Self-employment Experience-squared (origin)	-0.01***	-0.01***

	(0.001)	(0.001)
High Skilled	-0.12	-0.18*
	(0.1)	(0.09)
English Proficiency	-2.16***	-2.00***
	(0.13)	(0.13)
Manager & Professional	1.61***	1.52***
	(0.1)	(0.1)
Personal Characteristics		
Years Since Migration (YSM)	0.42***	0.38***
	(0.03)	(0.02)
YSM-squared	-0.01***	-0.01***
	(0.001)	(0.001)
Married	0.66***	0.64***
	(0.07)	(0.07)
Children	-0.42***	-0.43***
	(0.1)	(0.1)
Own Dwelling	0.33***	0.26***
	(0.1)	(0.09)
Observations	6735	6735
Log likelihood	-11635.10	-11596.7
Wald Chi2	1268.03	1359.78
AIC	23294.20	23221.32
Wald Chi2(2)		111.63
LR Chi2(2)		76.88
		(Prob>Chi2=0.0000)

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 ***
p<0.01

(2) The LR test and the AIC test used in Essay Three

The following tables show the test results for the LR test and the AIC test used in selecting the model for immigrants' location choices (refer to section 4.5).

Table A-3: Conventional vs. Spatial Model: Evidence from Immigrants' Location Choices

	Odds Ratios	
	Conventional	Spatial
Ethnic Capital		
Network Effect	/	32.03***
	/	(0.33)
Human Capital		
High Skilled	-1.36***	-0.19
	(0.2)	(0.23)
Personal Characteristics		
Age	-1.16***	-0.49***
	(0.13)	(0.17)
Age-squared	0.01***	0.01***
	(0.002)	(0.002)
Years Since Migration (YSM)	-1.05***	-0.43***
	(0.05)	(0.06)
YSM-squared	0.02***	0.01***
	(0.001)	(0.002)
Married	-3.37***	-1.40***
	(0.17)	(0.21)
Children	0.08	-0.35
	(0.25)	(0.29)
English Proficiency	-5.91***	-2.77***
	(0.37)	(0.58)
Own Dwelling	0.88***	1.29***
	(0.24)	(0.27)
Country of Origin		
UK & Ireland	-4.62***	-5.50***
	(0.26)	(0.3)
Asia	4.73***	-1.47***
	(0.27)	(0.31)
Observations	8020	8020
Log likelihood	-9717.32	-3038.295
Wald Chi2	11999.19	10007.36
Wald Chi2(1)	9165.04	
LR Chi2(1)	13358.04	
	(Prob>Chi2=0.000)	
AIC	19462.64	6106.59

Note: (1) Standard errors in parentheses
(2) * p<0.10 ** p<0.05 *** p<0.01
(3) Pacific binary variable is also included

Test Results Analysis

As a result, from the above two cases, we can find that the LR test suggests that the ethnic spatial lag is significantly important for immigrants' self-employment model and immigrants' location choices model should not be omitted. Furthermore, from the Wald test on the variable of ethnic spatial lag, we can see that the test result suggests the null hypothesis of the coefficient of that variable is equal to zero can be rejected. As a result, the spatial model is preferred in this case, and the effect of network on immigrants' self-employment decisions and location choices is not equal to zero.

Likewise, the spatial model generates a lower AIC than the conventional model does, which means the spatial model is the preferred approach to model immigrants' self-employment and location choices.

Appendix B

Table B-1: Hausman-Taylor Estimates of the Effects of Ethnic Capital on Log Hourly Wage:
Full-time Employed Male Immigrants in Australia, Age 25-55, HILDA (Wave 1-8)

	Asia	Rest of Word	ESC^	UK	New Zealand	Native-Born
Human Capital						
Potential Experience	0.0433*** (0.000396)	0.0142*** (0.000333)	0.0398*** (0.000270)	0.0229*** (0.000364)	0.0569*** (0.000556)	0.0415*** (0.0000847)
Potential Experience -squared	-0.00113*** (0.00000828)	-0.000150*** (0.00000677)	-0.000604*** (0.00000505)	-0.000270*** (0.00000643)	-0.00102*** (0.0000111)	-0.000467*** (0.00000176)
Proficiency in English	0.0222*** (0.00215)	0.0467*** (0.00371)	/	/	/	0.0498*** (0.00876)
High Skilled	0.0899*** (0.00707)	0.353*** (0.00582)	0.00394* (0.00210)	0.0324*** (0.00222)	0.0451*** (0.00497)	0.189*** (0.000865)
Personal Characteristics						
Years Since Migration (YSM)	0.0550*** (0.000290)	0.0379*** (0.000258)	0.0548*** (0.000190)	0.0547*** (0.000290)	0.0567*** (0.000381)	/
YSM-squared	-0.000224*** (0.00000634)	-0.000170*** (0.00000452)	-0.000621*** (0.00000311)	-0.000658*** (0.00000408)	-0.000845*** (0.00000811)	/
Married	0.463*** (0.00153)	0.0915*** (0.00129)	0.0232*** (0.000865)	0.00718*** (0.00122)	0.0706*** (0.00134)	0.0258*** (0.000298)
Arrived 2001-2008	1.458*** (0.0119)	1.447*** (0.00950)	1.479*** (0.00778)	1.542*** (0.0129)	1.349*** (0.0162)	/
Arrived 1991-2000	1.262*** (0.00849)	1.040*** (0.00663)	0.954*** (0.00419)	0.715*** (0.00698)	0.820*** (0.0121)	/
Arrived 1981-1990	0.766*** (0.00756)	0.942*** (0.00596)	0.485*** (0.00316)	0.451*** (0.00434)	0.403*** (0.0111)	/
Arrived 1971-1980	0.634*** (0.00697)	0.464*** (0.00502)	0.385*** (0.00301)	0.428*** (0.00405)	0.358*** (0.0108)	/
Arrived Before 1971	Ref.	Ref.	Ref.	Ref.	Ref.	/
Ethnic Capital						
Ln (Network Average Hourly Wage)	0.0126*** (0.000127)	0.00559*** (0.0000806)	0.00748*** (0.000117)	0.105*** (0.00139)	0.00926*** (0.000175)	0.176*** (0.00137)
Ln (Ethnic Concentration)	0.0244*** (0.000835)	0.0338*** (0.00124)	-0.0263*** (0.00122)	-0.0604*** (0.00251)	-0.306*** (0.00294)	-0.200*** (0.00252)
Constant	0.315*** (0.0102)	0.871*** (0.0107)	0.776*** (0.00538)	0.692*** (0.00907)	-0.509*** (0.0156)	1.516*** (0.00929)
Observations	638	609	1415	826	381	10120
sigma_u	0.7230	0.6146	0.6302	0.7468	0.7378	0.4970
sigma_e	0.3379	0.2535	0.2590	0.2486	0.2812	0.2475
rho	0.8208	0.8546	0.8555	0.9002	0.8731	0.8013
Wald Chi-square	3.36E+05	1.56E+05	3.29E+05	1.37E+05	1.28E+05	1.03E+06

Note: (1) Standard errors in parentheses

(2) * p<0.10 ** p<0.05 *** p<0.01

(3) ESC^ stands for Major English Speaking Countries:

United Kingdom, New Zealand, Canada, USA, Ireland and South Africa.

(4) For native-born model, we have controlled the age effect.

References

- Adjemian, M. K., Lin, C. Y. C., & Williams, J. (2010). Estimating spatial interdependence in automobile type choice with survey data. *Transportation Research*, 44, 661-675.
- Adsera, A., & Chiswick, B. R. (2007). Are there gender and country of origin differences in immigrant labour market outcomes across European destinations? *Journal of Population Economics*, 20(495-526).
- Aguilar, R., & Gusafsson, B. (1991). The Earnings Assimilation of Immigrants. *LABOUR*, 5(2), 37-58. doi:10.1111/j.1467-9914.1991.tb00036.x
- Aguilera, M. B. (2009). Ethnic enclaves and the earnings of self-employed Latinos. *Small Business Economics*, 33, 413-425.
- Aldrich, H., Cater, J., Jones, T., McEvoy, D., & Velleman, P. (1985). Ethnic residential concentration and the protected market hypothesis. *Social Forces*, 63(4), 996-1009.
- Aldrich, H., Jones, T., & McEvoy, D. (1984). Ethnic advantage and minority business development. In R. Ward & R. Jenkins (Eds.), *Ethnic Communities in Business* (pp. 189-210). New York: Cambridge University Press.
- Aldrich, H., & Waldinger, R. H. (1990). Ethnicity and entrepreneurship. *Annual Review of Sociology*, 16, 111-135.
- Andersson, L., & Hammarstedt, M. (2011). Ethnic enclaves, networks and self-employment among Middle Eastern immigrants in Sweden. *International Migration*. doi:10.1111/j.1468-2435.2011.00714.x
- Anselin, L. (1988). *Spatial Econometrics: Methods and Models*. Dordrecht: Kluwer Academic Publishers.
- Anselin, L. (1990). Some robust approaches to testing and estimation in spatial econometrics. *Regional Science and Urban Economics*, 20, 141-163.
- Anselin, L. (1999). *Spatial Econometrics*. Bruton Center, School of Social Sciences, University of Texas at Dallas, Retrieved from http://www.csiss.org/learning_resources/content/papers/baltchap.pdf
- Anselin, L. (2002). *Spatial regression analysis short course*. Unpublished manuscript, University of Michigan, Ann Arbor, MI.
- Anthony, D.L. (1999). The importance of trust in micro-credit borrowing groups. Paper presented at the Federal Reserve System Conference on Business Access to Capital and Credit, Arlington VA.
- Australian Bureau of Statistics. (2006). 2001 Census tables. <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Data>
- Australian Bureau of Statistics. (2007). 2006 Census tables. <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Data>
- Baltagi, B. H., Bresson, G., & Pirotte, A. (2003). Fixed effects, random effects or Hausman-Taylor?: A pretest estimator. *Economics Letters*, 79(3), 361-369.
- Bartel, A. P. (1989). Where Do the New U.S. Immigrants Live? *Journal of Labor Economics*, 7(4), 371-391.
- Battu, H., Seaman, P., & Zenou, Y. (2011). Job contact networks and the ethnic minorities. *Labour Economics*, 18(1), pages 48-56.
- Bauer, T., Epstein, G., & Gang, I. (2005). Enclaves, language, and the location choice of migrants. *Journal of Population Economics*, 18(4), 649-662.
- Beenstock, M., Chiswick, B. R., & Paltiel, A. (2010). Testing the immigrant assimilation hypothesis with longitudinal data. *Review of Economics of the Household*, 8(1), 7-27.

- Bernhardt, I. (1994). Comparative advantage in self-employment and paid work. *Canadian Journal of Economics*, 12(4):273-289
- Bertrand, M., Luttmer, E., & Mullainathan, S. (2000). Network effects and welfare cultures. *The Quarterly Journal of Economics*, 115(3), 1019-1055.
- Bonacich, P. (1972). Factoring and weighting approaches to status scores and clique identification. *Journal of Mathematical Sociology*, 2, 113-120.
- Bonacich, E., Modell, J. (1980). *The economic basis of ethnic solidarity: Small business in the Japanese American community*. University of California Press, Berkeley.
- Bond, P., & Townsend, R. (1996). Formal and informal financing in Chicago neighborhood. *Economic Perspectives*, 20(4), 3-27.
- Borjas, G. J. (1982). The Earnings of Male Hispanic Immigrants. *Industrial and Labor Relations Review*, 37, 222-239.
- Borjas, G. J. (1985). Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants. *Journal of Labor Economics*, 3(4), 463-489.
- Borjas, G. J. (1986). The self-employment experience of immigrants. *The Journal of Human Resources*, 21(4), 485-506.
- Borjas, G. J. (1987). Self-Selection and the Earnings of Immigrants. *The American Economic Review*, 77(4), 531-553.
- Borjas, G. J. (1989). Immigrant and emigrant earnings: A longitudinal study. *Economic Inquiry*, 27(1), 21-37. doi:10.1111/j.1465-7295.1989.tb01161.x
- Borjas, G. J. (1991). *Ethnic capital and intergenerational mobility*. National Bureau of Economic Research.
- Borjas, G. J. (1992). Ethnic capital and intergenerational mobility. *The Quarterly Journal of Economics*, 107(1), 123-150.
- Borjas, G. J. (1994). The Economics of Immigration. *Journal of Economic Literature*, 32(4), 1667-1717.
- Borjas, G. J. (1995). Assimilation and changes in cohort quality revisited: What happened to immigrant earnings in the 1980s? *Journal of Labor Economics*, 13(2), 201-245.
- Boyd, R. L. (1990). Black business transformation, black well-being, and public policy. *Population Research and Policy Review*, 9, 117-132.
- Breusch, T., & Pagan, A. (1980). The lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies*, 47(1), 239-253.
- Brock, W., & Durlauf, S. (2001). Discrete choice with social interactions. *Review of Economic Studies*, 68(2), 235-260.
- Buckley, F. H. (1996). The political economy of immigration policies. *International Review of Law and Economics*, 16, 81-99.
- Card, D. (1999). The causal effect of education on earnings. In O. Ashenfelter & D. Card (Eds.), *Handbook of Labor Economics* (Vol. 3A). Amsterdam: Elsevier.
- Card, D. (2000). *Estimating the returns to schooling: progress on some persistent econometric problems*. NBER Working Paper 7769. National Bureau of Economic Research, New York.
- Card, D. (2005). Is the new immigration really so bad? *The Economic Journal*, 115(506), 300-323.
- Chiswick, B. R. (1978). The effect of Americanization on the earnings of foreign-born men. *The Journal of Political Economy*, 86(5), 897-921.
- Chiswick, B. R. (1980). *An analysis of the economic progress and impact of immigrants*. The Employment and Training Administration, U.S. Department of Labor,
- Chiswick, B. R., Lee, Y. L., & Miller, P. W. (2002). *Longitudinal analysis of immigrant occupational mobility: A test of the immigrant assimilation hypothesis*. Bonn: The

- Institute for the Study of Labor. Retrieved from <ftp://repec.iza.org/RePEc/Discussionpaper/dp452.pdf>
- Chiswick, B. R., Lee, Y. L., & Miller, P. W. (2005). Immigrant earnings: A longitudinal analysis. *Review of Income and Wealth*, 51(4), 485-503. doi:10.1111/1467-9361.00039
- Chiswick, B. R., & Miller, P. W. (1995). The Endogeneity between Language and Earnings: International Analyses. *Journal of Labor Economics*, 13(2), 246-288.
- Chiswick, B. R., & Miller, P. W. (1996). Ethnic Networks and Language Proficiency among Immigrants. *Journal of Population Economics*, 9(1), 19-35.
- Chiswick, B. R., & Miller, P. W. (1999). Language skill and earnings among legalized aliens. *Journal of Population Economics*, 12(1), 63-89.
- Chiswick, B. R., & Miller, P. W. (2002a). *Do enclaves matter in immigrant adjustment?* IZA Discussion Paper 449. IZA, Bonn.
- Chiswick, B. R., & Miller, P. W. (2002b). Immigrant earnings: Language skills, linguistic concentrations and the business cycle. *Journal of Population Economics*, 15(1), 31-57.
- Chiswick, B. R., & Miller, P. W. (2005). *Computer skills, destination language proficiency and the earnings of natives and immigrants*. Bonn: IZA. Retrieved from <ftp://repec.iza.org/RePEc/Discussionpaper/dp1755.pdf>
- Chiswick, B. R., & Miller, P. W. (2008). *The "Negative" assimilation of immigrants: A special case* IZA Discussion Papers No. 3563. Institute for the Study of Labor (IZA), Bonn. Retrieved from <http://ideas.repec.org/p/iza/izadps/dp3563.html>
- Clark, K., & Drinkwater, S. (1998). Ethnicity and Self-Employment in Britain. *Oxford Bulletin of Economics and Statistics*, 60, 383-407.
- Clark, K., & Drinkwater, S. (2000a). Enclaves, neighbourhood effects and employment outcomes: Ethnic minorities in England and Wales. *Journal of Population Economics*, 15(1), 5-29.
- Clark, K., & Drinkwater, S. (2000b). Pushed out or pulled in? Self-employment among ethnic minorities in England and Wales. *Labour Economics*, 7(5), 603-628.
- Constant, A., & Massey, D. S. (2003). Self-Selection, Earnings, and Out-Migration: A Longitudinal Study of Immigrants to Germany. *Journal of Population Economics*, 16(4), 631-653.
- Cutler, D. M., & Glaeser, E. L. (1997). Are ghettos good or bad. *Quarterly Journal of Economics*, 112, 827-872.
- Damm, A. (2009). Determinants of recent immigrants' location choices: quasi-experimental evidence. *Journal of Population Economics*, 22(1), 145-174.
- Dávila, A., & Mora, M. T. (2000). English Fluency of Recent Hispanic Immigrants to the United States in 1980 and 1990. *Economic Development and Cultural Change*, 48(2), 369-389.
- Drever, A. I., & Hoffmeister, O. (2008). Immigrants and social networks in a job-scarce environment: The case of Germany. *International Migration Review*, 42(2), 425-448.
- Duleep, H. O., & Dowhan, D. J. (2002). Insights from longitudinal data on earnings of US foreign born men. *Demography*, 39(4), 485-506.
- Duleep, H. O., & Regets, M. (1997). Measuring immigrant wage growth using matched CPS files. *Demography*, 34(2), 239-249.
- Dunlevy, J. A. (1991). On the settlement patterns of recent Caribbean and latin Immigrants to the United States. *Growth and Change*, 22, 54-67.
- Dustmann, C., & Fabbri, F. (2003). Language proficiency and labour market performance of immigrants in the UK. *The Economic Journal*, 113(489), 695-717.

- Edin, P. A., Fredriksson, P., & Aslund, O. (2003). Ethnic enclaves and the economic success of immigrants-Evidence from a natural experiment. *Quarterly Journal of Economics*, 118, 329-357.
- Epstein, G. S. (2002). *Information cascades and decision to migrate*. Bonn: IZA.
- Evans, M. D. R. (1989). Immigrant Entrepreneurship: Effects of Ethnic Market Size and Isolated Labor Pool. *American Sociological Review*, 54(6), 950-962.
- Evans, M. D. R. (1989). Immigrant entrepreneurship: Effects of ethnic market size and isolated labour pool. *Am Sociol Rev*, 54(6), 950-962.
- Fernandez, M., & Kim, K. C. (1998). Self-employment rates of Asian immigrant groups: An analysis of intragroup and intergroup differences. *International Migration Review*, 32(3), 654-681.
- Fertig, M., & Schurer, S. (2007). *Earnings Assimilation of Immigrants in Germany: The Importance of Heterogeneity and Attrition Bias*. The German Socio-Economic Panel (SOEP) Paper No. 30., German Institute for Economic Research, Berlin. Retrieved from http://www.diw.de/documents/publikationen/73/diw_01.c.61960.de/diw_sp0030.pdf
- Fong, E., & Wilkes, R. (2003). Racial and ethnic residential patterns in Canada. *Sociological Forum*, 18(577-602).
- Friedberg, R., & Hunt, J. (2005). The impact of immigration on host country wages, employment and growth. *Journal of Economic Perspectives*, 9(2), 23-44.
- Frijters, P., Shields, M. A., & Price, S. W. (2005). Job Search Methods and Their Success: A Comparison of Immigrants and Natives in the UK. *The Economic Journal*, 115(507), F359-F376.
- Funkhouser, E. (2000). Changes in the geographic concentration and location of residence of immigrants. *International Migration Review*, 34(2), 489-510.
- García, I., Molina, J. A., & Navarro, M. (2008). The effects of education on spouses'satisfaction in Europe. *Applied Economics*, 42(28), 3607-3618.
- Gladden, T., & Taber, C. (2002). Wage progression among less skilled workers. In D. E. Card & R. M. Blank (Eds.), *Finding jobs: work and welfare reform* (pp. 166). New York: Russell Sage.
- Goetzke, F. (2008). Network effects in public transit use: Evidence from a spatially autoregressive mode choice model for New York. *Urban Studies*, 45(2), 407-417.
- Grbic, D., Ishizawa, H., & Crothers, C. (2010). Ethnic residential segregation in New Zealand, 1991–2006. *Social Science Research*, 39, 25-38.
- Hausman, J. A., & Taylor, W. E. (1981). Panel data and unobservable individual effects. *Econometrica*, 49, 1377–1398.
- Horvath, G. (2011). *Occupational mismatch and social networks*. Working paper series. Retrieved from <http://ssrn.com/abstract=1794082> or <http://dx.doi.org/10.2139/ssrn.1794082>
- Hammarstedt, M., & Shukur, G. (2009). Testing the home-country self-employment hypothesis on immigrants in Sweden. *Applied Economics Letters*, 16, 745-748.
- Jean, S., & Jimenez, M. (2007). *The unemployment impact of immigration in OECD countries*. OECD Economics Department Working Papers No.563. OECD Economics Department,
- Johnston, R., Poulsen, M., & Forrest, J. (2002). Rethinking the analysis of ethnic residential patterns: segregation, isolation, or concentration thresholds in Auckland, New Zealand. *Geographical Analysis*, 34, 245-261.

- Kanas, A., Tubergen, F. v., & Lippe, T. v. d. (2009). Immigrant self-employment: Testing hypotheses about the role of origin- and host-country human capital and bonding and bridging social capital. *Work and Occupations*, 36(3), 181-208.
- Katz, L. (1953). A new status index derived from sociometric analysis. *Psychometrika*, 18, 39-43.
- Kelejian, H., & Prucha, I. (1998). A generalized spatial two stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances. *Journal of Real Estate Finance and Economics*, 17, 99-121.
- Kelejian, H., & Robinson, D. P. (1993). A suggested method of estimation for spatial interdependent models with autocorrelated errors, and an application to a county expenditure model. *Papers in Regional Science*, 72, 297-312.
- Kidd, M. P. (1993). Immigrant wage differentials and the role of self-employment in Australia. *Australian Economic Papers*, 32(60), 92-115.
- Kobrin, F. E., & Speare, A. (1983). Outmigration and ethnic communities. *International Migration Review*, 17(3), 425-444.
- Kossoudji, S. (1988). English language ability and the labor market opportunities of Hispanic and East Asian immigrant men. *Journal of Labor Economics*, 6, 205-228.
- LaLonde, R., & Topel, R. (1991). Immigrants in the american labour market: Quality, assimilation, and distribution effects. *American Economic Review*, 81(2), 297-302.
- Lazear, E. P. (1999). Culture and language. *Journal of Political Economy*, 107, 95-126.
- Le, A. T. (2000). The Determinants of Immigrant Self-Employment in Australia. *International Migration Review*, 34(1), 183-214.
- Lee, L. (2007). GMM and 2SLS estimation of mixed regressive, spatial autoregressive models. *Journal of Econometrics*, 137, 489-514.
- LeSage, J., & Kelley, P. (Eds.). (2010). *Spatial Econometric Models*. Verlag Berlin Heidelberg: Springer.
- LeSage, J., & Pace, R. K. (2009). *Introduction to Spatial Econometrics (Statistics: A Series of Textbooks and Monographs)*: Chapman & Hall/CRC.
- Li, P. S. (2010). Immigrants' propensity to self-employment: Evidence from Canada. *International Migration Review*, 35(4), 1106-1128.
- Light, I. (1979). Disadvantage minorities in self-employment. *International Journal of Comparative Sociology*, 20(1-2), 31-45.
- Light, I., & Sanchez, A. A. (1987). Immigrants entrepreneurs in 272 SMSAs. *Social Perspect*, 30, 373-399.
- Lofstrom, M. (2002). Labor market assimilation and the self-Employment decision of immigrant entrepreneurs. *Journal of Population Economics*, 15(1), 83-114.
- Logan, J. R., Alba, R. D., & Stults, B. J. (2003). Enclaves and entrepreneurs: Assessing the payoff for immigrants and minorities. *International Migration Review*, 37(2), 344-388.
- Maani, S. A. (2004). Why Have Maori Relative Income Levels Deteriorated Over Time? *The Economic Record*, 80(248), 100-123.
- Maani, S. A., & Maloney, T. (2004). *Returns to post-school qualifications: New evidence based on the HLFS Income Supplement (1997-2002)*. Report to the Department of Labour. New Zealand Department of Labour, Wellington. Retrieved from <http://www.dol.govt.nz/PDFs/PostSchoolQuals.pdf>
- Maré, D. C., Morten, M., & Stillman, S. (2007). Settlement patterns and geographic mobility of recent migrants to New Zealand. *New Zealand Economic Papers*, 41(2), 26.

- Maré, D. C., & Stillman, S. (2009). *The labour market adjustment of immigrants in New Zealand*. Economic Impacts of Immigration Working Paper Series. Motu Economic and Public Policy Research, Wellington.
- Maré, D. C., & Stillman, S. (2010). The impact of immigration on the labour market outcomes of New Zealanders. from <http://www.dol.govt.nz/publications/research/impacts-labour-market-outcomes/impacts-labour-market-outcomes.pdf>
- Massey, D. S. (1985). Ethnic residential segregation: a theoretical synthesis and empirical review. *Sociology and Social Research*, 69, 315-350.
- Massey, D. S., & Denton, N. A. (1988). The dimensions of residential segregation. *Social Forces*, 67, 281-315.
- McDonald, J. T., & Worswick, C. (1999). The Earnings of Immigrant Men in Australia: Assimilation, Cohort Effects, and Macroeconomic Conditions. *Economic Record*, 75(1), 49-62. doi:10.1111/j.1475-4932.1999.tb02433.x
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behaviour. *Frontiers in Econometrics*, 8, 105-142.
- McManus, W., Gould, W., & Welch, F. (1983). Earnings of Hispanic men: The role of English language proficiency. *Journal of Labor Economics*, 1(2), 101-103.
- McManus, W. S. (1990). Labour market effects of language enclaves: Hispanic men in the United States. *Journal of Human Resource*, 25, 228-252.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415-444.
- Munshi, K. (2003). Networks in the modern economy: Mexican migrants in the U.S. labor market. *Quarterly Journal of Economics*, 118(2), 549-599.
- Nakamura, A., & Nakamura, M. (1985). *The second paycheck: A socioeconomic analysis of earnings*. New York: Academic Press.
- Organisation for Economic Co-operation and Development. (2001). The employment of foreigners: Outlook and issues in OECD countries. *OECD employment outlook 2001*. from <http://www.oecd.org/dataoecd/10/35/2079451.pdf>
- Papps, K. L., & Newell, J. O. (2002). *Identifying functional labour market areas in New Zealand: a reconnaissance study using travel-to-work data*. Institute for the Study of Labor (IZA).
- Parasnis, J., Fausten, D., & Cheo, R. (2008). Do Australian Qualifications Help? The Effect of Host Country Qualification on Migrant Participation and Unemployment*. *Economic Record*, 84, S131-S140. doi:10.1111/j.1475-4932.2008.00489.x
- Parks, V. (2004). The gendered connection between ethnic residential and labor-market segregation in Los Angeles. *Urban Geography*, 25(7), 589-630.
- Piore, M. J. (1979). *Birds of passage: Migrant labor and industrial societies*. Cambridge Cambridge University Press.
- Poot, J. (1993). Adaptation of migrants in the New Zealand labour market. *International Migration Review*, 27(1), 121-139.
- Poot, J. (1998). The impact of immigration on labour markets and urban infrastructure in Australia and New Zealand. In C. Gorter, P. Nijkamp & J. Poot (Eds.), *Crossing borders: Regional and urban perspectives on international migration* (pp. 129-157). Ashgate, Aldershot UK.
- Portes, A. (1987). The social origins of the Cuban enclave economy of Miami. *Sociological Perspectives*, 30(4), 340-372.
- Portes, A., & Jensen, L. (1989). The enclave and the entrants: Patterns of ethnic enterprise in Miami before and after Mariel. *American Sociological Review*, 54, 929-949.

- Poulsen, M., Johnston, R., & Forrest, J. (2000). Ethnic enclaves in New Zealand. *International Journal of Population Geography*, 6, 325-347.
- Raijmana, R., & Tienda, M. (2003). Ethnic foundations of economic transactions: Mexican and Korean immigrant entrepreneurs in Chicago. *Ethnic and Racial Studies*, 26(5): 783-801.
- Ethnic foundations of economic transactions: Mexican and Korean immigrant entrepreneurs in Chicago
- Ruiz, A. C., Gomez, L. N., & Narvaez, M. R. (2010). Endogenous wage determinants and returns to education in Spain. *International Journal of Manpower*, 31(4), 410-425.
- Saiz, A. (2006). Immigration and Housing Rents in American Cities. *IZA Discussion Paper 2189*.
- Sanders, J. M., & Nee, V. (1992). Comments and replies: Problems in resolving the enclave economy debate. *American Sociological Review*, 57(3), 415-418.
- Schultz, T. P. (1997). Demand for children in low income countries. In M. R. Rosenzweig & O. Stark (Eds.), *Handbook of population and family economics* (1 ed., Vol. 1, pp. 367). Amsterdam: Elsevier B.V.
- Scott, D. M., Coomes, P. A., & Izyumov, A. I. (2005). The location choice of employment-based immigrants among U.S. metro areas. *Journal of Regional Science*, 45(1), 113-145.
- Statistics New Zealand. (2006a). Quick Stats. 2006 Census Data. from <http://www.stats.govt.nz/Census/2006CensusHomePage/QuickStats/quickstats-about-a-subject/culture-and-identity/birthplace-and-people-born-overseas.aspx>
- Statistics New Zealand. (2006b). Total Personal Income and Work and Labour Force Status by Ethnic Group (Grouped Total Responses) and Sex, for the Census Usually Resident Population Count Aged 15 Years and Over. 2006 Census Population and Dwellings Tables.
- Statistics New Zealand. (2007). Birthplace by Sources of Personal Income, 2006 Census. from Statistics New Zealand <http://wdmzpub01.stats.govt.nz/wds/TableViewer/tableView.aspx>
- Stewart, J., & Hyclak, T. (1984). An Analysis of the Earnings Profiles of Immigrants. *The Review of Economics and Statistics*, 66, 292-296.
- Stillman, S., & Maré, D. C. (2009). *The labour market adjustment of immigrants in New Zealand*. Economic Impacts of Immigration Working Paper Series. The Department of Labour, Wellington. Retrieved from <http://www.dol.govt.nz/publications/research/lmainz/lmainz.pdf>
- Stillman, S., & Velamuri, M. (2010). Immigrant selection and the returns to human capital in New Zealand and Australia. from <http://dol.govt.nz/publications/research/trans-tasman-skill-return/immigrant-selection-and-the-returns-to-human-capital-in-nz-and-australia.pdf>
- Toussaint-Comeau, M. (2008). Do ethnic enclaves and networks promote immigrant self-employment? *Economic Perspectives*, 32(4th Quarter), 30-50.
- Trovato, F., & Halli, S. S. (Eds.). (1990). *Ethnicity and geographic mobility*. Ottawa: Carleton University Press.
- Van Auken, H. E., & Neeley, L. (1998). Evidence of bootstrap financing among small start-up firms. *Journal of Entrepreneurial and Small Business Finance*, 5(3), 235-249.
- Waldinger, R. H. (1986). Immigrant enterprise, a critique and reformulation. *Theory and Society*, 15(1-2), 249-285.

- Warman, C. (2007). Ethnic Enclaves and Immigrant Earnings Growth (Enclaves ethniques et croissance des gains des immigrants). *The Canadian Journal of Economics / Revue canadienne d'Economique*, 40(2), 401-422.
- Wilson, K., & Portes, A. (1980). Immigrant enclaves: An analysis of the labor market experiences of Cubans in Miami. *American Journal of Sociology*, 86, 195-319.
- Wilson, K. L., & Martin, A. W. (1982). Ethnic enclaves: A comparison of the Cuban and Black economies in Miami. *American Journal of Sociology*, 88(1), 135-160.
- Winkelmann, L., & Winkelmann, R. (1998). *Immigrants in New Zealand: A study of their labour market outcomes*. New Zealand Department of Labour Occasional Paper Series, 1. The Department of Labour, Wellington. Retrieved from <http://www.dol.govt.nz/PDFs/op1998.pdf>
- Winkelmann, R. (2000). The labour market performance of European immigrants in New Zealand in the 1980s and 1990s. *International Migration Review*, 34(4), 33-58.
- Yamauchi, F. (2004). Are experience and schooling complementary? Evidence from migrants' assimilation in the Bangkok labor market. *Journal of Development Economics*, 74(2), 489-513. doi:DOI: 10.1016/j.jdeveco.2003.06.007
- Yuengert, A. M. (1995). Testing hypotheses of immigrant self-employment. *Journal of Human Resources*, 30, 194-204.
- Zhou, M., & Logan, J. (1989). Returns on human capital in ethnic enclaves: New York City's Chinatown. *American Sociological Review*, 54, 809-820.
- Zhu, P., Liu, C. Y., & Painter, G. (2013). *Does residence in an ethnic community help immigrants in a recession?* W. J. Utery Workplace Research Group Working Paper 2013-3-1. Georgia State University, Retrieved from https://aysps.gsu.edu/sites/default/files/documents/uwrg/workingpapers/2013/2013-3-1_Liu_recessions%20and%20ethnic%20communities_John%20Quigley%20tribute.pdf