ESSAYS ON MIGRATION AND HOUSING

A Thesis Submitted to the Department of Real Estate and Planning in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

By

OLAYIWOLA OLADIPO OLADIRAN

January 2020

DECLARATION

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Name: Olayiwola Oladipo Oladiran

Date: 26 January 2020

Signature:

DEDICATION

To *YAHWEH*, my creator and sustainer

To my parents, Professor Johnson Akinade Oladiran and Mrs Bolanle Abiola Oladiran

To my amazing wife and daughter, Oluseyi Olaribidesi (snr) and Michelle Olaribidesi (jnr)

ACKNOWLEDGEMENT

I recognise that my hard work and commitment alone would have been insufficient for me to complete this research and the thesis. I therefore acknowledge that *YAHWEH* has been my strength, wisdom, guidance and sustainer; to *HIM* be all the glory, honour and praise.

I am extremely grateful to my supervisor Professor Anupam Nanda for pasturing me from the conceptual stage to the completion of this research; and for his insightful review, commentary and feedback. He did not just show interest in my research progress, but also my personal and mental wellbeing. I am also grateful to my second supervisor Dr. Stanimira Milcheva for laying the foundation for me to begin my PhD research. I am extremely thankful to Dr. Sarah Jewell, my Econometrics tutor who helped me to develop my econometric and quantitative skills in the last few years. She went out of her way to offer support and guidance in the course of this research and this has significantly improved the quality of my research output. Many thanks to the Reading Real Estate foundation (RREF) for providing the financial support for my PhD.

To my parents, Professor Johnson Akinade Oladiran and Mrs Bolanle Abiola Oladiran, I am thankful for the sacrifices you have made all through my life, and the encouragement and support you have always provided. I also owe a huge debt of gratitude to my amazing wife, Oluseyi, for her moral and emotional support, encouragement, drive and motivation; and to my lovely daughter, Olaribidesi, who has been an incredible source of joy, motivation and energy- they have always "boosted my morale". To Olaribidesi: I am hopeful that this accomplishment will inspire you to aspire for the pinnacle of greatness. To my siblings and their spouses (Jibola, Tofunmi, Yinka, Julia, Chris, Lamide, Olumide and Lola), I am thankful for your care and moral support throughout this process; and to my parents in-law (Pastor Rufus Atoki and Mrs Elizabeth Atoki), and my brothers in-law (Ope and Ayo), I thank you for your continuous interest in my progress, prayer and moral support.

I also appreciate the encouragement and support from my colleagues (Kola, Ijeoma, Marjia, Teejay, Seun, Cornelia, Tayo, Dexter, Carlos and Bahram) through this process. In conclusion, I wish to thank my friends at the Reading Parkside SDA Community Fellowship for the spiritual, social and moral support which they provided; and the Seventh-day Adventist Church, Minna, Nigeria where the seeds of determination, perseverance and self-belief were implanted in me several years ago.

Olayiwola O. Oladiran

ABSTRACT

Migration has remained a significant global concern which has engendered sentiments from international organisations, policy makers, scholars, the media and the citizenry; and housing is one of the major components of the migration-related debates. Some of the migration and housing-related debates are however based on anecdotal arguments rather than being evidence-based. This thesis therefore aims to expand the frontiers of the migration debate by providing evidence-based insight on the migration phenomenon and spotlighting its effects on the housing market.

This research begins by developing a gravity framework to test the resistance of global migration to the economic forces of gravity. Next, the study examines the potential links between migration policy changes and housing market shocks. A theoretical framework is developed to capture these potential effects, and the framework is tested using different empirical approaches and methods. The empirical analysis concludes with a comparison of the housing tenure outcomes of natives and generations of non-natives which improves insight on the variation in the housing patterns of natives and non-natives. The primary study areas in this thesis provide insight on migration and the housing market which can significantly improve the quality of the on-going migration-related debates and policy formulation.

The findings in this research confirm that the economic force of gravity is a key driver of global migration flow. This implies that there is a need to address global inequality in order to minimise the unhealthy pace of migration flow from developing countries to developed countries, particularly when these developed countries are surrounded by developing countries. The research also reveals that migration restrictions do not necessarily imply adverse impact for immigrants, rather the restrictive migration policy framework provides a sustainable basis for the selection of immigrants of higher socio-economic status which makes them more likely to make a faster transition on the housing ladder compared to immigrants in a more liberalised migration framework. The restrictive framework also has the potential to increase the prospects of social and economic integration of immigrants.

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CHAPTER ONE

Introduction

1.1 Background

Throughout human history, people have been on the move- exploring new places; pursuing better opportunities; and fleeing conflict, strife and hazardous environments (Hendriks, 2015)- a phenomenon broadly referred to as "migration". The recent pace and breath of this ubiquitous phenomenon is changing the face of the world and making societies more complex, complicated, and challenging (Spencer, 2003). Migration has therefore become a global concern, particularly over the past half century where there has been a dramatic metamorphosis in its volume and direction.

There are distinct migration patterns for developing and developed countries- increasing levels of emigration in developing countries and a simultaneous increase in immigration to developed countries **(**Migration Policy Institute, 2016); and these patterns are increasingly creating more heterogenous societies and communities. Migration significantly contributes to population growth, particularly in developed countries where immigration is reported to be at its highest level since 2007 (OECD, 2017a). With approximately 244 million people (three percent of the world population) living outside their places of birth in 2015 (International Organisation for Migration, 2018), countries increasingly find it difficult to adequately manage immigration, mainly because of its speed and depth, as well as the weakness in governance arrangements and inability to deal with difficult political trade-offs (Spencer, 2003).

OECD countries are by far the largest destination of immigrants (OECD, 2017a); and the United Kingdom is particularly one of the countries that has increasingly attracted a high number of immigrants from around the world in the last half-century[1]. According to OECD (2017c), the

[1]A full list of OECD countries is included in Appendix 1.1. It should be noted that OECD countries are heterogenous in terms of socio-economic status and wealth i.e. not all OECD countries are classified as highly wealthy.

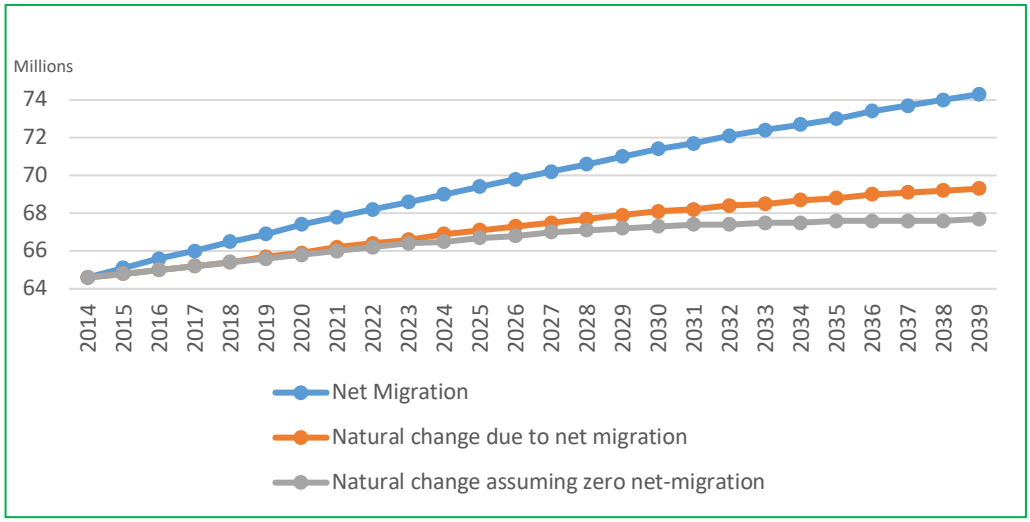
population of foreign citizens in the UK rose to 5.85 million in 2016, a 6.4% increase from the previous year. Immigration into the UK from within and outside the EU are almost evenly proportional, however, analysts attribute the recent spike in immigration to the EU expansion in 2004 which liberalised migration for the new EU countries. The diversity in the origin, background, socio-economic, demographic, and socio-cultural characteristics of UK further exacerbate immigration-related challenges.

The uptick in the volume of immigration to the UK led to extensive policy, economic and political debates culminating in the UK referendum on EU membership in June 2016 which led to a majority vote in favour of Brexit[2]. There are however indications that despite Brexit, the rate of migration to the UK may increase. Recent projections suggest that approximately 68% of the projected population increase in the UK is attributable to migration (as shown in Figure 1.1). With recent projections that immigration will increase in the next couple of decades (regardless of Brexit), it is expected that there will be further changes to demand dynamics for infrastructure, facilities, amenities and housing.

Migration may be triggered by a variety of factors: economic, social, environmental and political; but all these factors have a high degree of impact on the housing market because housing need is a common denominator for all individuals- native and non-natives, and housing expenditure typically makes up a significant proportion of household consumption cost. There is therefore the need to intensify research on the effects of migration on the housing market.

[2] Brexit refers to the British vote in 2016 to leave the European Union.

Figure 1.1. Net Migration and Population Projections in the UK (2014-2039)



Source*: Author's Illustration using data from ONS,2014 in Migration Directory, 2016*

Migration cannot be ignored, wished away or handled with laxity, hence planning integration strategies and investment in robust management systems are key for anticipating and effectively responding to migration. These management systems however depend upon adequate comprehension of the mechanism of migration and its associated effects. Thus, in order to better understand the migration phenomenon as well as its complex relationships with the housing market, it is imperative to analyse migrants from their points of origin to their destination as well as the channels, mechanism, and effects of the migration process on their housing patterns. This thesis therefore attempts to deepen insight on the migration phenomenon, its relationship with the housing market, and its impact on the housing outcomes of the native and the non-native population.

1.2 Aim and Objective of the Thesis

This research principally aims to analyse global migration patterns; and to develop conceptual and empirical models which sufficiently encapsulate the underlying mechanics of migration and its effects on the housing market.

In line with the research aim, the under listed objectives are explored:

1. To analyse the primary drivers of global bilateral migration flow in a gravity model framework;

2. To develop conceptual and empirical links between migration policy and the locational choices of immigrants;

3. To develop empirical links between liberalised migration and the housing outcomes of immigrants;

4. To examine the variation in the housing outcomes of natives and generations of non-natives.

1.3 Research Questions

The following research questions will be examined in order to aid the analysis of global migration patterns and the development of conceptual and theoretical links between migration and key housing segments:

i. Does global migration defy the economic forces of gravity?
    a. What are the key drivers of global migration flow?
    b. What insight does the gravity framework provide on global and continental migration flow patterns?
    c. How resistant is global migration flow to gravitational force?

ii. What is the link between migration policy and the locational choices of immigrants?
    a. What is the potential link between migration policy and the locational choices of immigrants?
    b. Are immigrants under a restrictive migration policy framework likely make different locational choices from immigrants in a more liberalised migration policy system?
    c. Will the changes to migration policy have more significant impact on the locational choices of immigrants in the short-run or in the long run?

iii. Does migration liberalisation affect the housing tenure patterns of immigrants?

   a. What are the potential links between migration policy changes and the housing tenure pattern of immigrants?
   b. What impact does liberalised migration policy have on the homeownership prospects of immigrants?
   c. Does migration liberalisation have the potential to increase the demand for public housing?

iv. Do natives and non-natives have different housing outcomes?

   a. Are there variations in the housing tenure patterns of natives and generations of non-natives?
   b. Do the key factors that influence housing tenure outcomes have varying degrees of impact on natives and non-native generations?
   c. Does the lifecycle theory have a different application to native and non-native migrant generations?
   d. Are the variations in the housing patterns of natives and non-natives consistent across country regions?

Based on the research background, objectives and questions, the next sections of this chapter provide the general theoretical and conceptual framework which underpin the research; and the subsequent chapters of the thesis provide further theoretical and empirical insight on the migration phenomenon and how this phenomenon may be linked to the housing market. Specifically, chapter two addresses the global migration flow patterns in a gravity model framework, while chapters three and four examine the link between migration policy and the locational and housing tenure pattern of immigrations. Chapter five further analyses the housing tenure patterns of natives and generations of non-natives, while section six provides the summary and concluding remarks to the thesis.

1.4 Conceptual and Theoretical Framework

This section builds on the research objectives and research questions by analysing previous scholarly perspectives relating to the migration phenomenon and the concomitant housing market effects. It offers insight on what previous research has accomplished, the theoretical and empirical issues that are associated with this field of study, and also serves as a guide to developing the appropriate strategy required for the research and the thesis.

1.4.1 Overview of Migration

Migration is a broad-based subject which has been explored by a variety of scholars in different disciplines thus subjected to various definitions. Traditional neoclassical economics views international migration as a simple sum of individual cost-benefit decisions undertaken to maximise expected income through international movement (Massey, Arango, Hugo, Kouaouci, Pallegrino, and Taylor, 1994). However, migration in human history has been based on voluntary and involuntary factors, transcending income expectation alone which makes this definition rather narrow in scope. A more contemporary definition therefore is along the lines of a relatively permanent movement of persons over a significant distance (Shaw, 1975). This definition captures two key dimensions- spatial (distance) and duration of residence (time) which other scholars typically allude to. Furthermore, the inclusion of the terms "relatively" and "significant" in the definition is an indication of the larger definitional variance. Spencer (2003) offers a more simplistic definition- "the movement of people between two nation-states". This definition adopts the keyword- "movement" which has been implicitly or explicitly espoused in traditional and contemporary migration definitions. Furthermore, this definition is simplistic, and it captures the "international" perspective of migration which appears to be the key theme in recent migration-related debates. The thesis therefore adopts the definition of Spencer (2003) as the basis for further theoretical and empirical analysis.

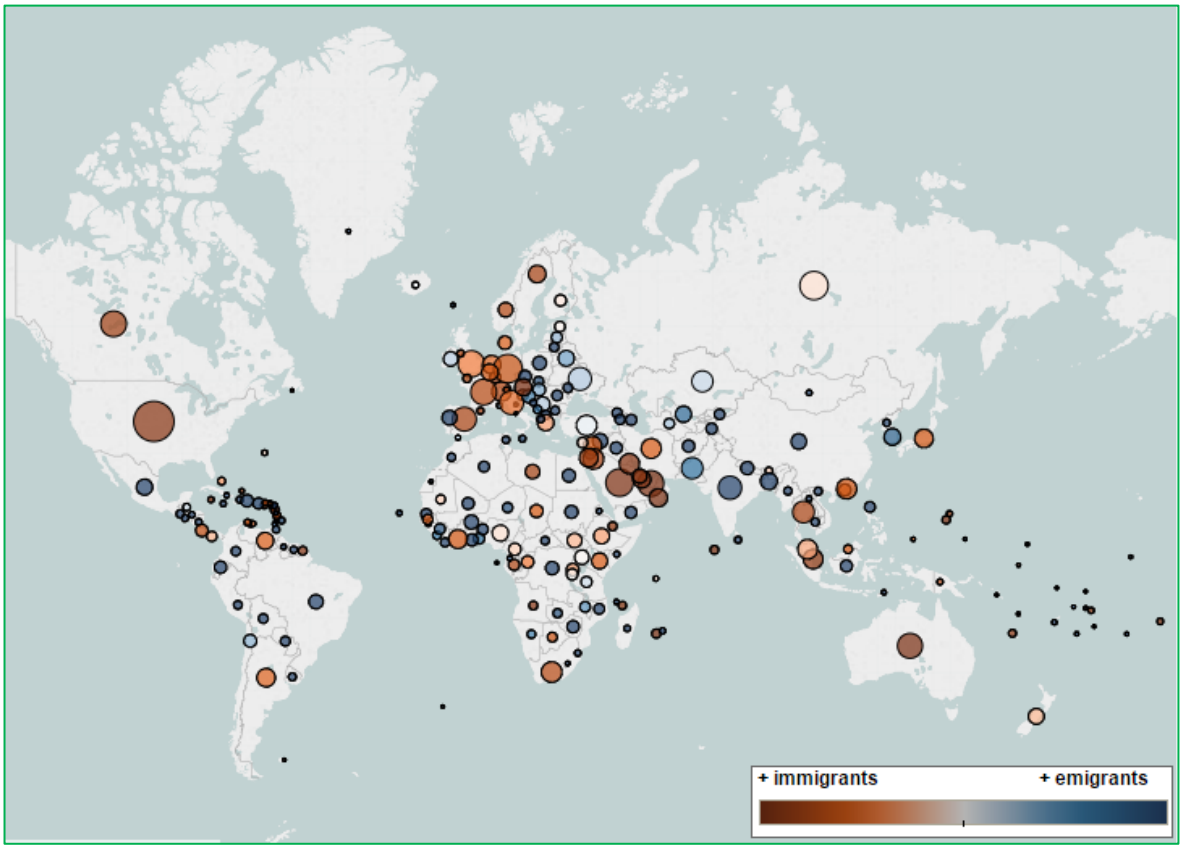
1.4.2 Historic and Recent Global Migration Trends

Earliest human migration can be traced back to several thousand years ago where ancient humans- descendants of a small group of Africans moved to occupy distant parts of the earth (National Geographic, ND). The development of agriculture in the recent millennium further led to population explosion, leaving a dramatic impact on global migration over the last 500 years. The migration trends in the last century has changed even further and Massey and Taylor (2004) attribute recent trends in international migration to the expansion and consolidation of global markets. However, there appears to be other deep-rooted factors beyond globalisation, especially considering that in the last half century, migrants have increasingly moved in a direction- towards Europe and North America (BBC, 2014).

The high volume of emigration from developing countries to more developed countries (as shown in Figure 1.2) may be connected to an economic and political misbalance (Stillman, Gibson, McKenzie and Rohorua, 2015). According to the World Bank (1996), approximately 1.3 billion of the world's population (close to one quarter) live in poverty- with three quarters in Asia, one-sixth in sub-Saharan Africa, one-tenth in Latin America, Eastern Europe and Central Asia, while the rest can be found in the Middle-East and North Africa. Furthermore, the fact that GDP per capita in Organisation of Economic Co-operation and Development (OECD) countries is nine times that in the middle-income countries and 68 times that in low income countries (Gibson, McKenzie, Rohorua and Stillman, 2018) gives further credence to the argument that lower economic fortunes may be responsible for the higher levels of emigration from developing countries and immigration to developed countries.

Pernia and Quibria (1999) reveal that poverty remains a formidable challenge to governments and the international community despite the numerous efforts to boost third-world economic growth and reduce inequality. Spencer (2003) further cautions that the current pace and scope of international migration are largely unsustainable and thus unhealthy.

Figure 1.2: Global Immigration and Emigration by Countries (2015 estimates)



Source: Migration Policy Institute (MPI) Data Hub, 2016.

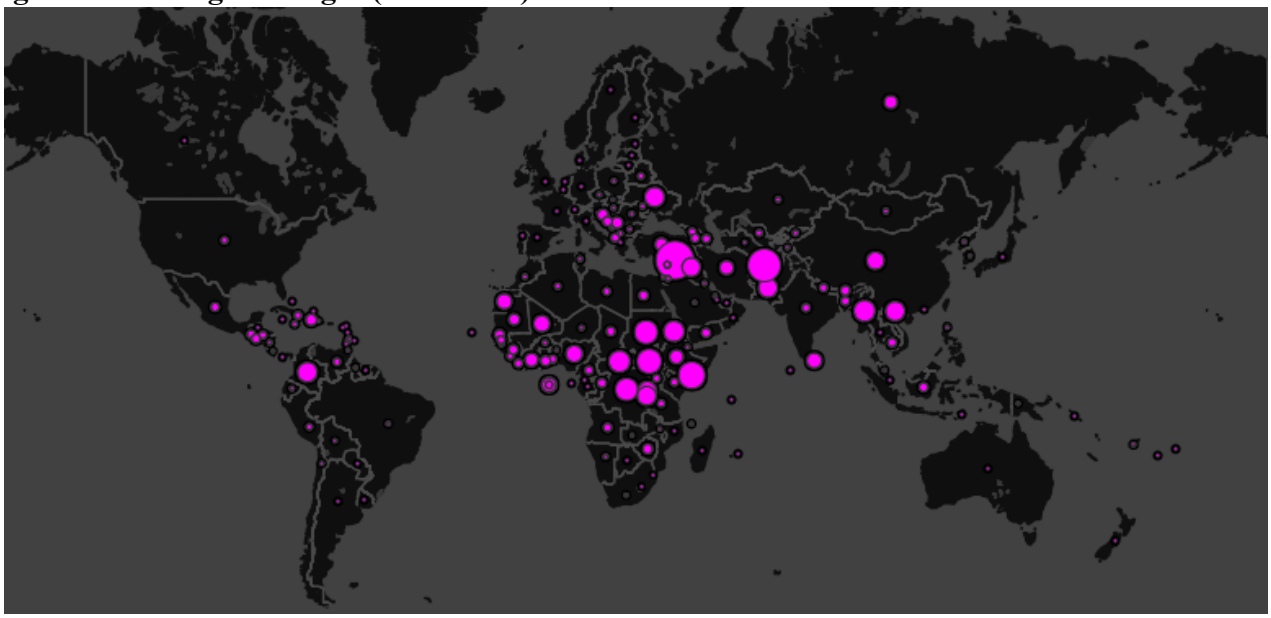
1.4.3 Economics of Migration

There are two dimensions that capture the factors/drivers of migration: the first captures the forces of migration, and the second captures the reasons for migration. Individuals migrate for different reasons and these reasons may serve as push forces (frustration, disappointment, threat to life and poverty) or pull forces (attraction, encouragement, motivation and hope of a better life) (see Hollifield, 2004). Push forces generally refer to factors that make individuals uncomfortable with residing in a country to the extent that it causes them to migrate to another country; while pull forces- an inverse, refers to those factors that attract migrants from other countries to a country. Usually, migrants succumb to either push forces, pull forces, or a combination of both forces. The reasons for migration (economic, political, social and environmental) is equally an important aspect of migration economics. It is however worthy of note that these different reasons for migration do not exert push/pull forces evenly.

Economic migrants account for majority of migrants (Grigg, 1977). These group of migrants relocate in order to improve their standard of living (BBC, 2014) which may be better job opportunities, access to capital, higher income and wages, social benefits, pension, taxes, productivity, education, macroeconomic stability, training and human capital development (Gibson et al., 2017). Economic migrants are typically susceptible to both push and pull forces. For instance, the lack of job opportunities and lower income may encourage individuals to move out of a country, and these individuals are typically attracted to countries with better job opportunities, higher income and better quality of life, thus they are induced to countries with better economic opportunities. From a global perspective, the economic migration push forces are mainly exerted in South East Asia, Eastern Europe, Latin America and sub-Saharan/North Africa, while the economic pull forces are mainly exerted from the OECD countries (Gibson *et al.,* 2017; OECD Migration Outlook, 2017). Based on the foregoing, it is evident that both push and pull forces exert almost evenly distributed forces for economic migrants.

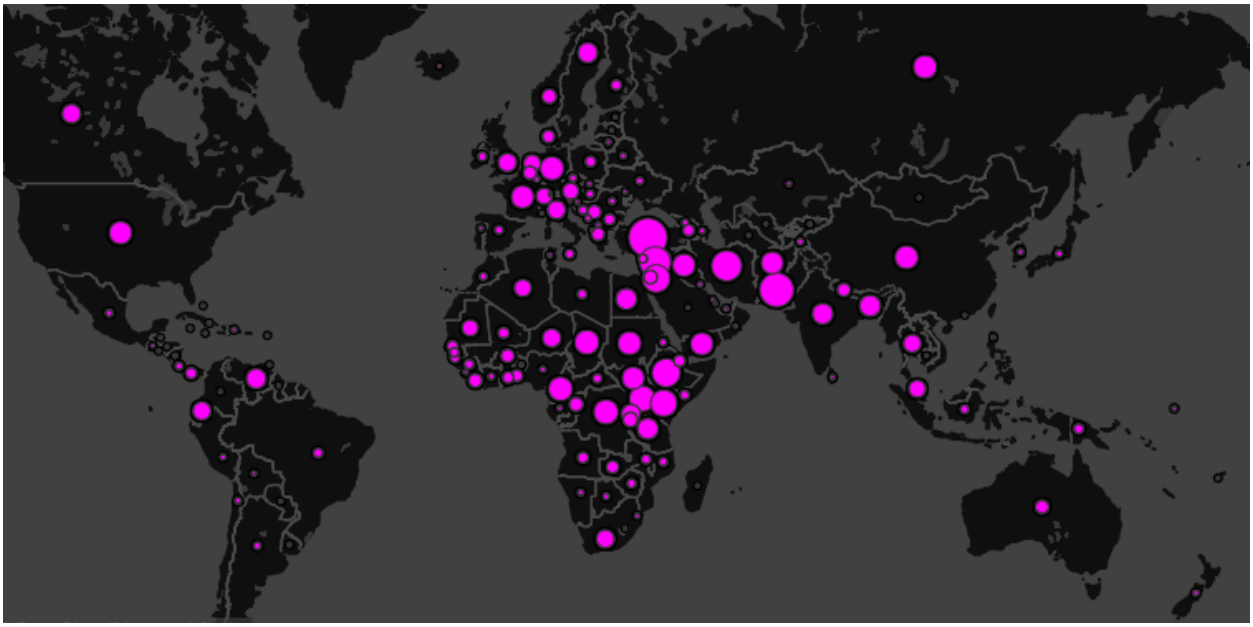
Political migrants are migrant that usually migrate involuntarily and are sometimes referred to as "forced" migrants (Richmond, 1993). The principle of asylum was established in the Geneva Convention of 1951 which proposed that an individual with well-founded fear of persecution that was once admitted to the territory of a safe state cannot be arbitrarily expelled or sent back to his/her state or nationality (Hollifield, 2004). Political migrants include internally displaced individuals escaping war, violence and crime who usually become refugees and sometimes, asylum seekers. Their bid to flee civil unrest, wars, discriminatory state policies, political persecution and armed conflict serves as push forces and an impetus for them to move to other countries (Robertson, 2013). It is therefore expected that they will seek to relocate to countries with lower levels of violence and higher levels of political stability. Figures 1.3 and 1.4 show the global outlook of the major origin and destination countries of political migrants.

Figure 1.3: Refugees Origin (2000-2015)



Source: UNHCR; *Popstats; Migration Policy Institute, 2017*.

Figure 1.4: Refugees Destination (2000-2015)



Source: UNHCR; *Popstats; Migration Policy Institute, 2017*.

Between 1992 and 2001, developing countries accommodated about 70% of the world's refugee population and at the beginning of 2002, approximately nine million (75% of the world's refugees) were from Africa and Asia (Jeff, 2003; also see Figures 1.3 and 1.4). Some of these immigrants moved further to Europe and North America in some cases, while some other refugees moved from Syria, Afghanistan, Somalia and South Sudan (among others) to destinations such as Turkey, Pakistan,

Lebanon, Iran, and Ethiopia (among others). The increase in displacement of people from the Middle East in particular has led to a move toward Europe, hence a significant spike in political migration to the OECD countries in Europe (Ramos and Surinach, 2013). Europe therefore currently appears to be the arrow-head in accepting asylum seekers, with Germany and Sweden taking the lead. The Arab spring- insurgencies in three North African states, also exacerbated the increase in political migration, leading to a spike in asylum applications over the last decade, particularly in the EU and European Free Trade Association (EFTA) regions (Joffe, 2011). Political migrants are generally less induced by the conditions of the destination countries i.e. they are often pushed out of their present locations to look for other alternatives of settlement and will typically be less concerned about the conditions of the destination country, provided the destination country is politically stable and guarantees their safety and welfare. Migration push forces are therefore typically stronger than pull forces in relation to political migrants.

Social migrants are individuals who migrate for the purpose of reuniting with their family members and loved ones. Family reunification is a recognised reason for immigration in many countries, and the presence of one or more family members in a certain country sometimes enables other members to immigrate. Social migrants are a more heterogeneous group compared to other types of migrants. They are diverse in terms of their age, educational background, skills, and country of origin. While family and personal networks are key in international migration and a major channel of permanent migration to OECD countries in recent years (Boyd, 1989; Kofman, 2004), migration policies relating to family reunion play a major role in controlling the volume of social immigrants in a country. Governments increasingly struggle to reconcile priorities and policy objectives around family unification and reunification rights while ensuring border security, immigration control and maintaining an attraction to strategic labour targets; hence a variation of family reunification laws exist across countries leading to disparity in the global pattern of social migrants (Migration Integration Policy Index, 2015). Social migrants are generally less induced by the destination countries i.e. they are often pulled into the

destination country by the presence of family members or individuals with whom they have mutual relationship, thus there are minimal factors pushing them out of their countries of origin. Migration pull forces are therefore typically stronger than push forces in relation to social migrants.

Environmental migrants are forced or involuntary migrants, thus driven mainly by push forces. One of their key attributes is that they typically move short distances (Bremner and Hunter, 2014). This migration type entails a dynamic and complex interaction of environmental and non-environmental factors at a range of scales. Environmental migrants may be "pushed" by environmental hazards such as floods, earthquakes, notable land loss, degradation, climate change, drought, desertification, and rises in sea levels which typically have long term effects. Environmental migration may be based on dramatic (e.g. tsunami and hurricanes), or gradual and more long-term environmental strain (e.g. drought that emerges across several growing seasons). While environmental migrants are often classified as involuntary migrants, Bates (2002) suggests that they may have some level of control over the decision to migrate, but this varies by the type of environmental disruption. Gradual degradation for instance allows environmental emigrants to determine how they respond to environmental change while more rapid disasters are accompanied by heavy shocks and migration waves. Warner (2010) also states that migration and displacement are part of a spectrum of possible responses to environmental change and some forms of environmentally induced migration may be adaptive, while other forms may indicate a failure of the social-ecological system to adapt. Environmental migrants are generally less induced by the conditions of the destination countries i.e. they are often pushed out of their current locations to look for other alternatives of settlement and will typically be less concerned about the conditions of the destination country, provided the destination country is has better environmental conditions and guarantees their safety and welfare. Migration push forces are therefore typically stronger than pull forces for environmental migrants.

Based on the foregoing analysis, a new conceptual framework termed "the dual dimensions of migration" is developed in this thesis. This concept is based on the harmonisation of the forces of

migration and the reasons for migration. This new framework (dual dimensions of migration) is set on the premise that while it may true that migration exerts pull and push forces regardless of the reason for migration, the strength of these forces may vary with the different reason for migration (as shown in Table 1).

Table 1.1: Dual Dimensions of Migration (forces and reasons of migration)

Reasons for Migration	Migration Forces	
	Push Forces	**Pull Forces**
	Economic Unemployment, low income, skills mismatch, high educational qualification, labour market over-supply, informal employment, high labour regulation, weak labour union, poor quality of education, socio-economic inequality	**Economic** High quality of capital and credit, high macroeconomic levels and stability, higher labour demand, higher income and wages, demographic shortage, employment access for disadvantaged groups, higher educational standards, demand for high skilled labour
	Political Political instability, insecurity, discrimination, gender inequality, lack of rule of law, war, victimisation, state policy, violence, armed conflict	Political Political stability, higher level of security, equality, rule of law, stronger judiciary and legal systems, stronger institutional framework
	Social Separation from friends, family and loved ones; and discrimination based on sexual orientation	**Social** Unification and reunification, reunion, favourable family reunification laws, social networks, retirement benefits, more liberal policies regarding sexual orientation
	Environmental Natural disaster, hazardous environment, flood, earthquakes, land loss, degradation, drought, desertification, rising sea level, weather patterns, tsunami, hurricane	Environmental Better environmental condition

Only a few examples of each of the reasons for migration are cited

Legend
Strong forces
Weak forces

Source: *Author's Construct, 2019*

1.4.4 Migration and Housing Economics

Housing is one of the core areas where the effect of migration is strongly felt. It is a fundamental human need, a life denominator and a key proportion of individual and household consumption (Hulchanski, 1995; Kutty, 2005). Thus, several studies (such as Saiz 2003, 2007) have shown that the influx of immigrants in a country alters the housing market dynamics at micro (local and metropolitan) and macro (regional and national) levels. The effects of immigrants on the housing market can be traced through the variation in their (immigrants) housing patterns in comparison to the housing

patterns of natives[3] as well as the demand shocks which accompany them. Literature has shown that just like other aspects of life, natives and immigrants have different housing tenure and locational patterns. Their different housing patterns will therefore send different demand waves into the housing market which cause different shocks with variant effects on rents and house prices

There are several factors driving the variation in the housing outcomes of natives and immigrants. These may be migration-related factors (such as the reasons for migration and country of origin), generational and lifecycle effects (such as age and birth generation), life pathways of natives and non-natives (such as socio-economic and socio-cultural factors) residential mobility patterns (such as frequency of mobility, housing tenure and spatial factors) and factors related to the destination country (such migration policy).

One of the most distinct effects of international immigration is the re-defining of urban and spatial patterns, and this can be observed at regional, metropolitan and neighbourhood levels. Immigrants prefer certain regions and metropolitan areas (Åslund, 2005; Anas, Arnott and Small, 1998; Pew Research Center, 2017), particularly larger cities and economic hubs which often leads to ethnic and immigrant clusters (concentration of immigrants). Studies have also shown that local neighbourhood and regional characteristics (Owusu, 1999, Åslund, 2005), affordability challenges (Owusu, 1999), and socio-demographic and socio-economic factors (Zavodny, 1999; Jaeger, 2007) may be responsible for locational choices of immigrants; and these may further define the spatial patterns in urban areas.

Another strand of literature in migration and housing economics relates to the housing tenure patterns of natives and non-natives. Data reveals that variations exist in the housing tenure patterns of natives and non-native groups (Migration Observatory, 2016). These variations are generally attributed to individual, household and locational factors (Borjas, 2002); socio-demographic and socio-economic factors (Nygard, 2011; Kuebler and Rugh, 2013); and socio-cultural factors (Zorlu, Mulder and Baalen,

[3] Natives are generally categorised as individuals that were born in a country, live in that country, and their parents were also born in the same country.

2014). While the spatial and housing tenure effects of migration are important, there is growing scholarly interest in the literature regarding how these factors affect housing demand, rents and house prices. The impact of migration on housing market forces and by extension, rents and house prices is not just a function of the housing tenure and locational choices of immigrants but also the response of natives to immigrants' housing patterns. This may manifest though tipping, segregation, discrimination, native flight (Saiz and Wachter, 2011); which may result in changes in absolute rents and house prices, and also changes in their growth rates (Saiz, 2003; 2007; Fischer, 2013).

As stated in the introductory sections of this chapter (sections 1.1, 1.2 and 1.3), the scope of this thesis is limited to housing tenure and locational choices of immigrants. This thesis therefore does not primarily focus on the effects of migration on rents and house prices. However, an attempt is made in the two empirical chapters (which are related to housing) in this thesis to relate the research findings to housing demand and the housing market in general.

1.4.5 Immigration in the UK Context

Three of the four empirical chapters of this thesis are approached from the context of the United Kingdom; thus, a UK-based dataset is utilised for the empirical analysis. There is therefore the need to provide a brief background and overview of immigration as it relates to the UK.

The United Kingdom is a hub for financial services, professional services, information technology, tourism and politics; and it has increasingly utilised its economic, political and historic prestige to exert great influence across the globe. Akdrick (2018) reports that the UK is the fifth largest economy in the world. It is also a founding member of the United Nations, and the traditional heart of the Commonwealth of Nations. Furthermore, it is one of the Second World War victor countries and has helped shape post-war international architecture (Tisdall, 2015). Its status in the first half of the 20th century won it a permanent seat and veto power on the UN Security Council and made it a founder-member of NATO (North Atlantic Treaty Organisation). These, and other factors therefore

strategically position the UK as a major global power and as the fifth global migration destination (Migration Data Portal, 2019).

Immigration to the UK intensified following the liberalisation of migration for citizens of Commonwealth countries after the Second World War II in 1948. This era of migration created a wave of immigrants from previous British colonies particularly from Africa, Asia and the Caribbean Islands. The liberalisation of migration for Commonwealth citizens to the UK ended with the introduction of the 1971 Immigration Act. By 1973 however, the UK joined the European Economic Commission (now known as the European Union) and by 1993, migration was liberalised for EU citizens (Table 1.2 summarises the key landmarks associated with the EU evolution).

Table 1.2: Key Landmarks in the European Economic Commission/ European Union Evolution

1957	European Economic Commission began with Belgium, France, Germany, Italy, Luxembourg and the Netherlands	**1993**	Free movement was implemented/ EEC became EU
1973	Accession of Denmark Republic of Ireland and the United Kingdom	**1995**	Accession of Austria, Finland and Sweden
1981	Accession of Greece	**2004**	EU-A10 counties (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia)
1986	Accession of Portugal and Spain/ European Act signed (creating single market for free trade)	**2007**	Accession of Bulgaria and Romania
1989	Law of free movement (trade) within the EU was passed	**2013**	Accession of Croatia
1992	European treaty on free movement was signed	**2016**	Brexit vote

***Source**: Author's illustration using information from the European Union (nd).*

These two key immigration waves (Commonwealth and EU immigration waves) have defined the composition of UK immigrants and by extension, the UK's urban and regional landscape[4]. Table 1.3 provides evidence that indeed UK immigrants are predominantly drawn from Commonwealth and EU countries.

[4] Chapters 3, 4 and 5 will provide more insight on migration evolution in the UK and the associated links to key segments of the UK housing market.

Table 1.3: Foreign Born Population in the UK (2015)

Origin Countries	Number of Migrants
India	780,000
Poland	700,000
Pakistan	540,000
Ireland	500,000
Germany	320,000
Bangladesh	230,000
South Africa	220,000
Nigeria	220,000
United States of America	210000
China	180,000
Jamaica	170,000
Italy	150,000
Kenya	150,000
France	150,000
Philippines	140,000

Source: United Nations Population Division, 2015; Pew Research Centre, 2015.

The increase in the number of immigrants to the UK also has demographic implications. For instance, ONS (2016B) reveals that approximately 27% of live births in England and Wales in 2015 were to foreign born women (Table 1.4 shows further details). This rate- the highest the UK's history implies an additional increase in the number of second-generation migrants which is a further extension of the migration effects in a destination country.

Table 1.4: 10 most common Countries of Birth for non-UK born Mothers and Fathers in England and Wales (2005)

Rank	Origin Country of Mother	% of UK births	Origin Country of Father	% of UK births
1	Poland	3.3	Pakistan	2.9
2	Pakistan	2.5	Poland	2.7
3	India	2.0	India	2.1
4	Romania	1.3	Bangladesh	1.3
5	Bangladesh	1.1	Nigeria	1.3
6	Nigeria	1.0	Romania	1.2
7	Lithuania	0.7	Somalia	0.6
8	Germany	0.7	Germany	0.6
9	Somalia	0.7	South Africa	0.5
10	South Africa	0.5	Lithuania	0.5

Source: *ONS, 2016B.*

The implication of the foregoing is that in addition to these countries accounting for first generation immigrants, thy may also be accounting for a large proportion of the second-generation migrants currently, and in the future. The empirical papers of this thesis will therefore analyse the waves of immigrants to the UK and the implication of these immigration waves on the housing and locational patterns of immigrants in the UK. Furthermore, one of the empirical papers will also focus on the potential implications of the immigration waves and the variation in the housing tenure patterns of natives and non-natives in the UK.

1.5 Research Paradigm

This section provides a general discussion on the research philosophy and approach. The section is important for establishing the appropriateness and credibility of the assumptions by which this thesis is underpinned. Paradigms as universally recognised scientific achievements that for a time provide model problems and solutions to a community of practitioners (Kuhn, 1962). According to Collis and Hussey (2014), the research paradigm is a philosophical framework which guides the conduct of scientific research based on researchers' philosophies and assumptions about the nature of knowledge[5]. The research paradigm determines the research design and influences the research methodology and methods (McKerchar, 2009; Collis and Hussey, 2014). This suggests that the research paradigm in a research can significantly affect the research process and approach; and further influence the validity or reliability of the research results and findings. Paradigms can be used at different levels: at the philosophical level- where the term is used to reflect basic beliefs about the world; at the social level, where the term is used to provide guidelines about how the researcher should conduct his/her

[5] Philosophy is "a set or system of beliefs stemming from the study of the fundamental nature of knowledge, reality and existence" (Waite and Hawker, 2009, p. 685).

endeavours; and at the technical level where the term is used to specify the methods and techniques that ideally should be adopted when conducting research (Morgan, 1979).

Issues surrounding the reality and nature of knowledge evolved over time and this has given birth to different research paradigms. Systematic methods of research before the late 19th century involved observations and experiments which applied inductive logic to discover explanatory theories that could be used for prediction. Notions about the nature of knowledge were based on positivism (developed by theorists such as Comte-1778-1854, Mill-1806-1873 and Durkeim- 1859-1917), which has its roots in the philosophy known as realism. By the late 19th century, another paradigm had emerged-interpretivism based on the perceived limitations of positivism. This paradigm is underpinned by the belief that social reality is not objective but highly subjective because it is shaped by our perceptions. Researchers in this paradigm adopt a range of methods that seek to describe, translate and otherwise come to terms with the meaning, not frequency of certain naturally occurring phenomena in the social world (Van Maanen, 1983, p.9). The findings from interpretivist studies are derived from qualitative methods of analysis which are based on the interpretation of qualitative research data. Thus, research underpinned by this paradigm has been perceived as any type of research where findings are not derived from the statistical analysis of quantitative data (Corbin and Strauss, 2008).

In determining the best approach to research, a researcher should consider the philosophical assumptions that underpin the research and make a comparison with the approach in previous research in the study area in order to carefully develop the research structure and design (Collis and Hussy, 2014). Based on literature review, it can be observed that studies which approach migration and housing economics from a from a macro-level (such as global, national and regional scope) often utilise quantitative data and thus adopt quantitative methods of analysis. Furthermore, these studies identify and sometimes develop appropriate theoretical and conceptual frameworks, hypotheses and empirical models to test these hypotheses using quantitative methods. These approaches therefore appear to be positioned in the realms of positivism.

Positivism is underpinned by the belief that reality is independent of the researcher and therefore test theories based on empirical research and quantitative methods (Smith, 1983; Creswel, 2014). Positivists therefore assume that social reality is objective and external to the researcher; knowledge comes from objective evidence about observable and measurable phenomena; the researcher is independent from the phenomena under study; the researcher uses the passive voice, accepted quantitative words and set definitions; and the researcher takes a deductive approach, studies cause and effects and uses a static design where categories are identified in advance, generalisation leads to prediction, and explanation and understanding of the results are accurate and reliable through validity and reliability[6].

The positivist research paradigm provides a suitable framework for scientific research methods, particularly when quantitative methods of analysis are adopted. It is therefore not surprising that several migration economists increasingly conduct their research in the realm of a paradigm that stems from positivism. One of the merits of this paradigm is that experiments can be controlled and repeated, and the results can be scientifically verified based on logical and mathematical proof for every rationale and justifiable assertion (Walliman, 2011). This paradigm also makes it possible to apply logical reasoning so that precision, objectivity and rigour underpin the research rather than subjectivity and intuitive interpretation. Furthermore, a positivist study allows for the use of large sample sizes, precision, quantitative analysis and results of high reliability. In addition to these, it allows for the generalisation of results based on a sample of the population. Based on these, the positivist paradigm underpins the approach to this research.

[6] Ontological assumptions (the nature of reality); epistemological assumptions (what constitutes valid knowledge); axiological assumption (role of values); rhetorical assumptions (the language of research); and methodological assumptions (the process of research) respectively.

1.6 Major Issues, Challenges and Limitations associated with Migration-related Research

In approaching this research, certain issues, challenges and limitations have been identified based on the evidence and approach of previous studies. As stated earlier, migration is a complex phenomenon; therefore, migration-related research often suffers from data and methodological issues. Majority of the issues are associated with data availability and quality. One main issue is that there is usually insufficient information on the characteristics of immigrants in their origin country before migration occurs which makes it difficult to conduct comparative analysis of their lives prior to migration and their lives after migration. Another closely related issue is that there is usually a gap between the immigrant's time of arrival in the destination country and when they get enrolled in surveys. While this is not always the case, it is a problem in many cases which may make it impossible to account for vital information relating to the characteristics of immigrants between the period of arrival and when they get enrolled in the survey.

Some data issues also relate to the data quality. For instance, there are cases of data mismatch. Some databases have adequate information on immigration information of the immigrants but have inadequate information on immigrants' individual and household characteristics; while other databases have insufficient immigration information of the immigrants but have reasonably sufficient individual and household characteristics. Especially in cases where these datasets cannot be merged, this problem has the potential to restrict the use of the data in exploring a wider range of research questions.

In addition to these, there are other issues which are also common in this area of research- missing observation and unbalanced panel data. This often make panel regression difficult even when panel data is available, and it also makes pooled panel regression challenging because the error term will usually be correlated with the observations. Other methodological issues include omitted variable bias and unobserved heterogeneity arising from data unavailability and data quality issues which often makes it difficult to account for all the necessary factors of interest in a single model. Furthermore,

endogeneity is often a concern in micro-level migration studies because one of the factors being observed often tends to affect other factors which are being examined in the studies.

Another issue relates to the positivist research paradigm. The assumption (in a positivist approach) that it is impossible to separate people from social contexts in which they exist may be called to question, particularly because individuals cannot be adequately understood without examining the perceptions that they have of their own activities. Furthermore, a highly structured research design imposes constraints on the results and may fail to capture other relevant findings and patterns. In addition to these, while researchers may appear to be objective, they sometimes can introduce bias through selection of methods, data and empirical strategy selections. It can also be argued that it is impossible to capture complex phenomena such as migration in a single-measure model[7].

The key issues and limitations identified in this section will be highlighted in the empirical chapters and these will be addressed accordingly.

1.7 Structure of the Thesis

The thesis consists of six chapters. The first part of chapter one gives a broad overview and background of global migration patterns and its associated effects. This chapter also states the research aim and objectives, and further delves into the broad and specific questions which this research probes. Furthermore, the chapter provides the justification for the research, as well as the scholarly contribution made particularly as it relates to housing and the urban landscape. This chapter effectively provides the motivation for the thesis, and the factors that make the thesis relevant and important. The second part of chapter one provides the research framework and the research paradigm. This involves the use of literature to develop the conceptual framework that underpins the research, and the justification for the areas that the individual empirical studies focus on. This chapter includes the

[7] For instance, it is not possible to capture a person's intelligence by assigning numerical values.

underlying research paradigm and philosophical framework, the approach, methods, methodology and the limitations.

Chapter two provides a longitudinal analysis of global bilateral migration flows, while controlling for both bilateral and multilateral drivers of migration in a gravity model framework. It analyses the push and pull forces of migration as well as the geographic, demographic, economic, socio-cultural and political drivers of migration flow. Following a well-articulated background of the global migration trends, a section in this chapter reviews the literature relating to the application of the gravity model to migration patterns. After this, key econometric issues associated with this model are discussed and ways of mitigating against them are also outlined. Following this, data from the UN, World Bank and CEPII are used to test the economic forces of gravity on global bilateral flows, and the results obtained from the Poisson PML (Pseudo-Maximum Likelihood) models are further discussed.

Chapter three analysis the changes in the locational patterns of immigrants which are associated with migration policy changes. The chapter develops an appropriate conceptual framework which links migration policy to the socio-economic, socio-cultural, and demographic characteristics of immigrants, and further links these factors to their potential locational choices. Using the UK Household Survey data from 2009-2017, the section analyses the impact of migration policy changes on the location choices of immigrants from British colonies after the Immigration Act of 1971 and the immigrants from countries that joined the EU in 2004. Using approaches similar to regression discontinuity design and difference in differences, the results which survive several robustness tests, are analysed.

Chapter four also examines the potential effects of migration policy framework, but this time, in the context of the housing tenure patterns of immigrants. Using very similar conceptual and theoretical framework as in chapter three, chapter four maps out the potential relationship between migration policy, the socio-economic composition of immigrants, and their housing tenure patterns using the UK

Longitudinal Survey data from 2009-2017. This chapter focuses on the potential impact of liberalised migration policy on housing outcomes. It examines the changes in the housing tenure patterns of immigrants from the countries that joined the EU in 2004 (before and after the accession in 2004) using approaches similar to regression discontinuity design and difference in differences. Several other robustness checks are conducted which guide the discussion of the results and findings.

Chapter five makes a wider comparison- in this case of natives and different generations of non-natives (first generation and second-generation migrants). The chapter principally aims to analyse the similarities and differences in the housing tenure outcomes of natives and first-generation immigrants; and to further compare those differences with second generation migrants (the children of first-generation migrants). This chapter provides valuable insight on the variation in the impact of key factors (socio-economic, individual, socio-cultural, household, locational) on the housing pattern of natives and generations of non-natives and provides further insight on how this varies by income group and across UK regions.

Chapter six provides the conclusive remarks for this thesis. It summarises the thesis and highlights the research questions, the results and the implications of these results. This chapter also highlights the major contributions which the thesis makes. The chapter concludes by identifying the research limitations and making recommendations for further studies.

CHAPTER TWO

Does Migration Defy the Force of Gravity? An analysis of global migration patterns

2.0 Introduction

The previous chapter set the background and framework for this thesis and introduced the four interrelated themes which will be the subjects of further empirical analysis. This chapter focuses on the first theme of the thesis: global migration flow patterns and the gravity model framework. The study investigates whether the gravity framework- one of the most traditional empirical regularities in international economics, provides useful insight into global migration flow patterns. Previous studies which have attempted to model migration in a gravity model framework have either focused on regional, continental, sub-continental or country-level analysis; and studies which have attempted to cover a wider spectrum have done this by analysing migration stock (rather than migration flow). In sum, previous gravity model studies on migration flow have used a limited number of countries which effectively makes this study the first most comprehensive global study of migration flows.

This study empirically analyses global bilateral migration flow of 182 world countries in a gravity model framework while controlling for economic and non-economic migration drivers. The novelty in this empirical study presents itself in multiple scales: the scope of the study (global), the measurement of migration (migration flow rather than migration stock); and the methods and methodology adopted. The following research objectives are explored in this chapter:

i. To examine the economic and non-economic (geographic, demographic, historic and socio-cultural) drivers of the current global migration patterns;
ii. To investigate the use of the gravity model as a framework for analysing global migration flow patterns, and to develop appropriate models which sufficiently estimate the "economic forces of gravity" on global bilateral migration flows;

iii. To analyse continental-level migration in the gravity framework and to further analyse the continental variation in the effect of various economic and non-economic drivers of migration.

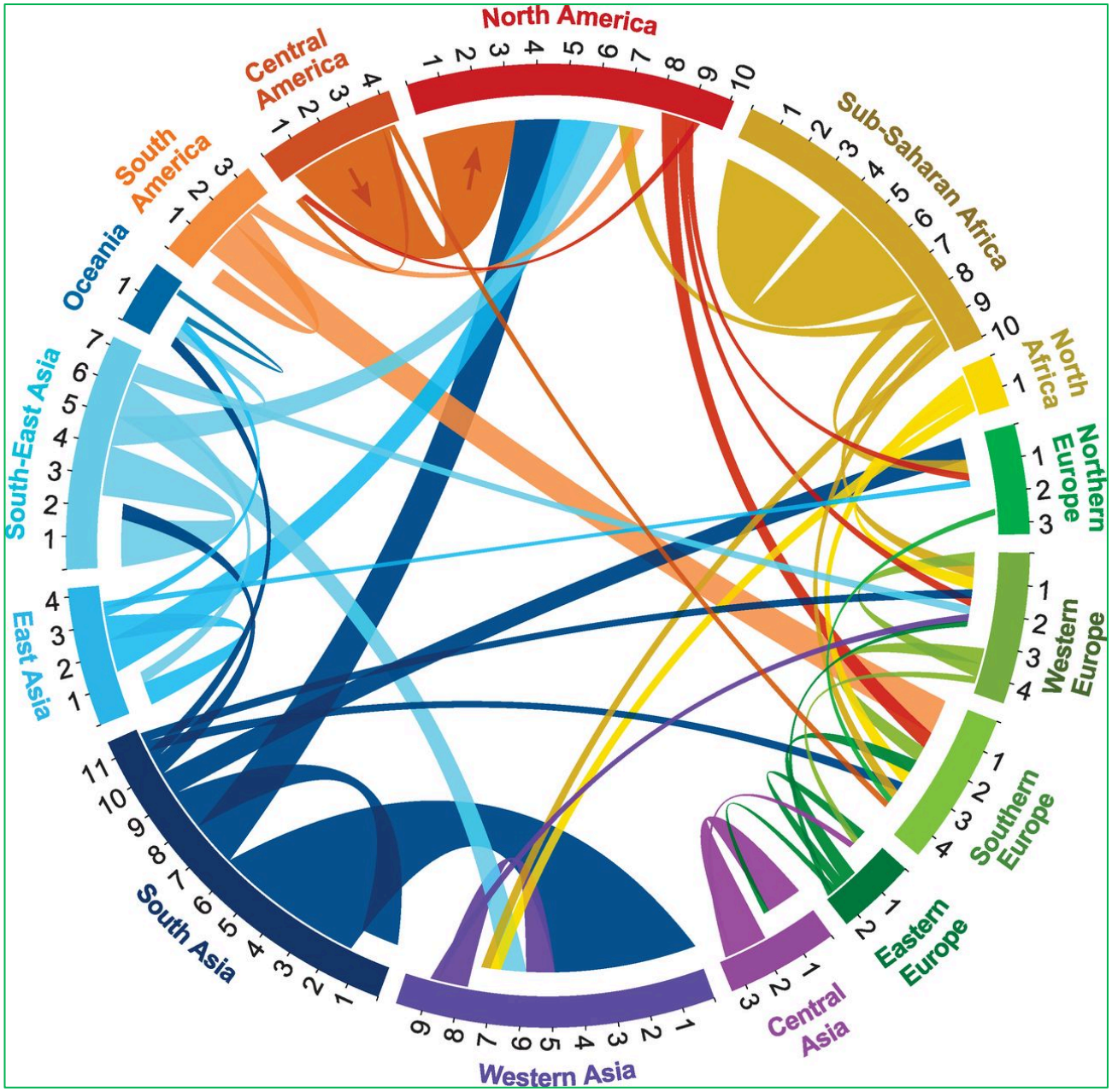
2.1 Background and Motivation of the Study

The movement of people across international borders (migration) is an intrinsic element of the global landscape and it has evolved considerably over time and across countries (Mayda, 2010). The Gallup (2009) Survey revealed that approximately 16% of the world's adult population have a penchant to migrate across international borders (Esipova and Ray, 2009) which suggests that migration will remain a relevant topic and a global concern in the foreseeable future.

Migration is by no means a random occurrence, rather, it is a systematic mechanism engineered by several complex factors which often leave demographic, economic, cultural, social, political and environmental footprints in the migration originating and destination countries. Scholars and policy makers are therefore committed to expanding the knowledge and comprehension of the migration mechanism based on historic data. More important, however is improving understanding on how historic migration patterns can provide insight on future trends. This often requires a robust analysis of the drivers of previous migration which becomes the basis for projecting future migration.

Abel and Sander (2014) offer very interesting insight on global immigration flow. The authors develop a circular plot on migration flow between and within World regions based on UN data estimates from 1990-2010 (snapshot in Figure 2.1).

Figure 2.1 Circular plot of Migration Flows between and within World Regions (2005 to 2010).



Source: *Abel and Sander, 2014 (p.1522).*

The study shows that on average, 0.6 percent of the world population relocated from their current country of residence over five years (between 2005 and 2010), and as shown in figure 2.1, immigrants from African countries tended to move within the continent, whereas immigrants from Europe moved to more diverse destinations. It can be further observed that the most profound migration occurred within Africa, between West and South Asia, and from Latin America to North America. The study

also shows that developed regions of the world experience more immigration (positive net migration) while developing countries have higher levels of emigration (negative net migration).

This circular plot is an important contribution because it offers visual details on the intensity and pattern of global migration flows between 196 world countries, broken down into continental and regional flows. However, this is merely descriptive- it shows where people are moving from and where they are moving to but does not indicate the factors that are driving the observed pattern. It will therefore be insightful to add a layer of empirical evidence to this descriptive insight which may provide further knowledge and understanding on the drivers of current global migration patterns.

Scholarly debates on migration are typically contextualised in the migration push-pull framework which categorises the drivers of migration as pull or push forces (as discussed in chapter one). Indeed, the traditional migration push-pull concept (developed by Ernst Georg Ravenstein, 1834-1913) appears to adequately capture the drivers of migration. A plethora of other theories however abound which also attempt to contextualise migration flows from other perspectives and the gravity model framework is one of such alternative estimation frameworks.

The gravity model framework offers an interesting insight on the mechanism through which migration occurs, as well as the size and direction of migration flow. The estimation of migration using the gravity model framework is not without precedence. However, previous studies are usually limited in geographical scope (Kim and Cohen, 2010; Ramos and Surinach, 2013). Other key issues relate to econometric and methodological strategies and the quality and availability of data on cross-country migration flows with time-series properties (Abel, 2010; Kim and Cohen, 2010). These, and other challenges often constrain scholarly contribution, particularly the use of quantitative methods, in analysing migration flow patterns. A considerable proportion of the theoretical and empirical review in this study will therefore focus on some of these issues.

2.2 Migration Economics and the Gravity Model Framework

2.2.1 Primary Drivers of Migration Flow

The primary drivers of migration in a gravity framework are often categorised as demographic (e.g. population growth, high fertility rates), geographic (e.g. distance and contiguity), economic (e.g. GDP, poverty level, employment/unemployment, wages, education, healthcare), political (e.g. conflict, violence, poor governance, corruption, safety, security), historic (e.g. colonial relationship) or cultural factors (e.g. human rights abuse, discrimination, family reunification, common language, diaspora migration).

Literature provides evidence on the specific effects of the highlighted factors above on migration flow between countries. For instance, Clark, Hatton and Williamson (2007) provide evidence that bilateral migration flow between a country pair will be higher if both countries have a mutual language. Other studies have also provided evidence that having mutual colonial links consistently and significantly increases international migration flow between a country pair (see Mayda, 2005; Neumayer, 2005; and Clark et al., 2007). It should however be noted that because most former colonies retained the language of their colonial masters, there may be a high correlation between having a mutual language and past colonial history which may lead to multicollinearity issues in empirical modelling.

The proportion of urban-rural population of the origin country has also been identified as a key determinant of migration flow. Neumayer (2005) suggests that the urban-rural ratio controls for information asymmetry in the migration origination country. The argument is that individuals living in cities will have access to more robust information regarding international migration opportunities compared to their rural counterparts. The fact that most travel and immigration support agencies and embassies are in urban areas (Martin, 2003) gives further credence to this line of thought. This therefore implies that a migration origination country that has a higher urban-rural population ratio is likely to have a higher emigration rate. In the destination country, a relatively large urban population

might indicate better job opportunities for new immigrants which will also be accompanied with a higher likelihood of receiving support from already existing social networks (Kim and Cohen, 2010).

There is also evidence that the age structure of the population of a country can impact migration direction. A low potential support ratio (PSR)[8], is an indication of an ageing population which may further indicate a shortage in the working-age population and the economic demand for immigrant workforce in the country. Most developed countries have a low PSR and weakening workforce, consequently expressing the need for a larger percentage of working-age individuals (Kim and Cohen, 2010). It is expected that, *ceteris paribus,* a migration originating country with a higher PSR would experience more emigration towards richer destination countries than would a migration originating country with lower PSR. Conversely, a country with a low PSR is likely to attract more immigrants than a country with high PSR.

Other key indicators of global migration flow relate to quality of life such as infant mortality rate (IMR) and life expectancy at birth (see Reidpath and Allotey, 2003). The expectation is that a country that has a high IMR rate or low life expectancy rate will have a higher level of emigration compared to countries with lower IMR and higher life expectancy rate; while countries with lower IMR and higher life expectancy rates should experience a higher level of immigration compared to countries with higher IMR or life expectancy. This suggests that countries with higher IMR and lower life expectancy may not be attractive to migrants as much as countries with a lower IMR and higher life expectancy rate.

The presence of global cities in a country is also a key driver of migration flow, particularly serving as a strong pull factor. This can be explained in the context of the world systems theory which suggests that global cities in destination countries e.g. New York, London, or Paris have a concentration of wealthy and highly educated workforce which simultaneously creates a strong demand for unskilled

[8] Defined by the number of individuals aged 15-64 per individual aged 65+.

international workers to do menial jobs (Massey, Arango, Hugo, Kouaouci, Pellegrino, and Taylor, 1993).

2.2.2 The Application of the Gravity Model Framework in Migration

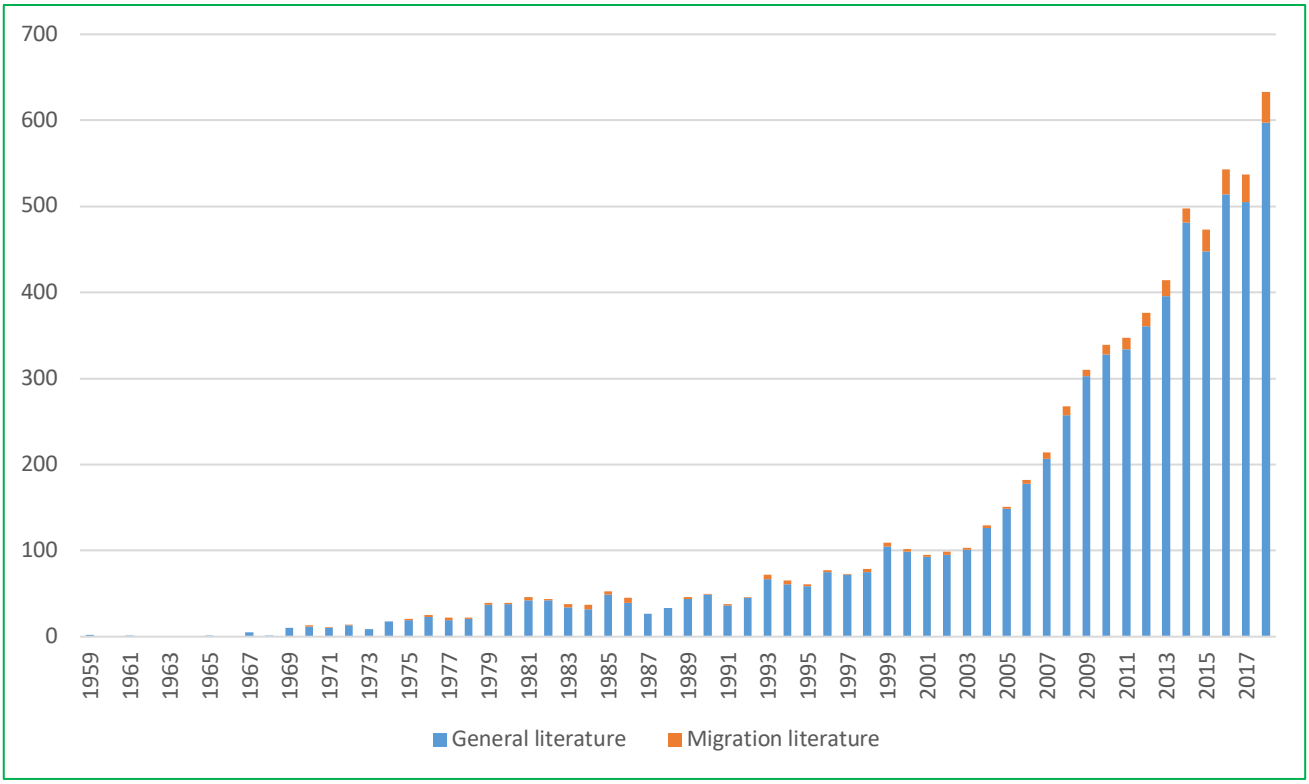
The factors highlighted in previous sub-section have been analysed in several ways and using several approaches and empirical frameworks. According to Howe and Jackson (2006), many theories and empirical approaches to international migration which claim to provide appropriate insight on international migration have been proposed[9] with different weaknesses and strengths. The gravity model framework is one of such empirical frameworks through which migration economists analyse migration patterns.

Empirical estimation using the gravity model framework is an offshoot of Newton's law of gravity. The Newton's law of gravity suggests that the shorter the distance between two objects, and the greater the mass of either or both objects, the greater will be the gravitational pull force between them. This empirical framework tends to emphasise the importance of distance and size in estimating a gravity equation. The gravity model has long been popular for analysing economic phenomena relating to international trade flows (Santos Silva and Tenreyro, 2006; and Linders, Burger and van Oort, 2008), technological advancement and real estate investment flows (McAllister and Nanda 2016).

The application of this framework to economics of migration has also experienced a rapid increase in the last two decades and this has increased even more in the last decade (Figure 2.2). This research will therefore be making a valuable contribution to literature on the application of the gravity framework, particularly in the field of migration economics.

[9] Some of these theories include the neoclassical theory, new economic theory, dual (segmented) labour market theory, world system theory, social capital theory, and cumulative causation theory (see Massey et. al., 1993); and different estimation techniques include the markov chain models, matrix population models and the gravity model.

Figure 2.2: The adoption of the Gravity Model Framework in Literature (1959-2018)[10].



Source: *Author's drawing based on data from Scopus, 2019*

The application of the gravity framework to migration was first adopted by William J. Reilly in 1931, and it has been used to analyse migration trends and patterns in recent studies (see Poot, Alimi, Cameron and Mare, 2016; and Bang and MacDermott, 2019). The model predicts that *ceteris paribus* countries with large sizes experience more emigration than countries with smaller sizes; and countries with large sizes attract more immigrants than countries with smaller sizes. The model further predicts distance decay which implies that the migration between two countries decreases as the distance between the two countries increases (Kim and Cohen, 2010). The economic gravitational force for migration is therefore measured in terms of how the size of the two countries and distance between them may increase the volume of migration between the two countries. This implies that two places with larger sizes and shorter distance will have more migration interaction (emigration or immigration) compared to smaller countries which are wider apart in geographic terms.

[10]Showing the number of entries in Scopus when using the search terms "gravity model"; and "gravity model" in "migration" field

The “distance” component of the gravity framework can be perceived as a proxy for transportation and psychic cost (Greenwood, 1975) as individuals generally have less information about more distant locations and are less likely to migrate to locations for which they have little or no prior information. However, the remarkable advancement in transportation and communication technology may question the scope and the application of this concept as this has the potential to minimise the effects that physical distance would normally have on the migration flow.

2.2.3 Econometric and Empirical Challenges and Considerations in the Gravity Model Framework

Even though the use of the gravity framework to model migration patterns has experienced significant upsurge in the last decade, some limitations have hindered its full exploitation. One of the key challenges which scholars face is the availability and quality of data (Ramos, 2016). Access to bilateral country-pair migration flow data has been limited, particularly at global level. It is for this reason that several studies (such as Ramos and Surinach, 2013) use migration stock to proxy for migration flows.

Several debates surround the use of bilateral migration flows, net migration flows or migration stock as the measure of migration. It can be argued that the decision of an individual to migrate from his/her country of origin to another country has unique implications which require a migration origin-destination-based approach which is only possible with the use of gross bilateral migration flows data. The use of migration stock data for this may therefore be unsuitable because variations in migration stocks are influenced by return migration or third-country migration which may result in negative values with econometric implications (Ramos, 2016).

Another problem that is associated with the use of migration stock as a measure of migration is that results are interpreted as the representation of long-term equilibrium. The stock measure insufficiently captures the mechanism behind the actual migration from one country to another and this can potentially prevent the observation of other vital information. Migration flow information on the other hand informs policy makers, the media and scholars on the direction of population movement. Access

to data on migration flow will therefore significantly boost the prospects of a more robust analysis of global migration trends and thus improve insight on the mechanism of historic and current trends and future projections.

Another issue of "contention" relates to the derivation of the economic gravitational force in the gravity model framework. As stated in the section 2.2.2, the two indicators which are measured to determine the economic gravitational force are the distance between two countries and the size of the two countries. Different approaches have been adopted in measuring this economic gravitational force. Distance is typically measured by the number of kilometres between the two capital cities of the country pair which is derived by calculating the city's longitude and latitude using the great circle formula (Mayer and Zignago, 2006). Measuring the size of the countries is however more contentious. The main contention relates to the use of population or land area as a measure of the size of the country. As far as economics of migration is concerned, however, population remains a key economic indicator (compared to land area) because of the changes in population over time which provides some form of variability which can be explored in econometric analysis. Thus, the population of a country is usually the measure the country size; however, some scholars tend to include both factors in their empirical models also. Cohen, Roig, Reuman, and GoGwilt (2008) however caution that a country's population and land area are usually highly correlated, and this can lead to multicollinearity issues among independent variables.

Other issues are related to the econometric estimation of gravity model. The first issue is multilateral resistance to migration[11]. Accounting for the multilateral resistance to migration is an important consideration in estimating a gravity model because it addresses the potential problem that the migration flow between a country pair will be dependent on the time varying characteristics relating to the strength of the pull forces of a destination country relative to the weaker pull forces from other

[11] This is similar to Similar Multiple Trade Resistance (MTR) in Anderson and van Wincoop (2004) and it will be referred to as MRM in other parts of the chapter

destination options (Bertoli and Moraga, 2013). Failing to control for these migration alternative destinations may therefore bias estimates. Both countries in a migration flow pair have relationships with other countries which indicates that the bilateral migration flow does not solely depend on bilateral resistance (such as population size and distance), but also depends on the extent to which mutual barriers or multilateral resistance to migration (which other countries are exposed to) affect the countries in the pair. This therefore implies that any negative (or positive) change in bilateral resistance may make migration more attractive (or less attractive) to immigrants who prefer a destination country to other destination options. This underscores the importance of controlling for origin-year and destination-year fixed effects which are added to mean-difference out the multiple resistance to migration (see Anderson and van Wincoop, 2003, 2004; and McAllister and Nanda, 2016).

The second econometric estimation issue relates to how zero values in migration flows are dealt with. This challenge is more complicated, and it sometimes require the exploration of other alternative estimators-away from the traditional OLS estimator. Dealing with zero values is a major concern because a high frequency of zero migration flows has the potential to bias estimates (see Linders and De Groot, 2006). There are different approaches to managing the zero bilateral migration flow issue. One approach is to drop all observations with zero migration flows. However, this may result in the loss of significant information from the model and also a decrease in the sample size with econometric consequence. Alternative approaches entail the transformation of the variable which measures migration flow, adopting alternative estimation techniques or a combination of both approaches. Some studies transform the migration flow data by adding a positive constant (eg 1.0) to all the migration flow values (see McAllister and Nanda, 2016). This effectively creates some value for the zero flow observations, while maintain the scale of variance across the migration flow data. Santos Silva and Tenreyro (2006) however argue that this technique may lead to inconsistencies, and their severity will depend on the sample sizes and model specifications; as well as reflecting potential measurement error issues with the data.

The problem of the "zero values" in the migration flow can also be addressed using alternative estimation method. These methods include the use of count data models such as the Poisson models, negative binomial models, and zero-inflated models; as well as the application of the Heckman's selection model in order to correct for the possibility of migration in the gravity model. Some technical issues however need to be carefully considered when applying these procedures. With the Heckman's approach, the main challenge is to find an appropriate instrument (i.e. a variable that explains the absence of migration flows but is not related to the size of the migration flows). For instance, the existence or non-existence of a diplomatic representation among the considered countries may affect the probability of initiating migration but not necessarily the magnitude of the flows; while the absence of a diplomatic representation of a destination country in the origin country may amount to an increase in the cost of obtaining visas as immigrants from the origin country may need to go to another country to secure their visas. This may therefore discourage immigrants from the origin country from attempting to migrate to the destination country. These studies however show results to be consistent even if they do not consider instruments when using the same set of variables to predict both the possibility of having migration flow between countries and the volume of those flows.

The Poisson pseudo-maximum likelihood (PML) estimation (proposed in Santos Silva and Tenreyro, 2006) is also capable of dealing with zero trade flows, moderating heteroscedasticity and consequently estimating the equations in levels (it has been successfully implemented in several studies such as Linders et al., 2008 and McAllister and Nanda, 2016). The Poisson specification is built around the observed volume of flow between two countries with a conditional mean that is a function of multiple characteristics (Linders et al., 2008). Thus, the efficiency of the PML estimator borders on the log-linear link function that incorporates zero migration flows naturally and estimates efficiently in the face of heteroscedasticity. This method however tends to over-weigh high-value migration flows and the estimation procedure can face problems of convergence towards the optimal value of the parameters.

The gravity model framework has some other limitations. First, the data is based on official records, hence it usually does not capture illegal migration flow which accounts for a reasonable proportion of global migration (Kim and Cohen 2010). Second, the variation in the definition of international migrants across different countries in the world may create some inconsistency in the migration flow data (Cohen et al., 2008). For instance, some countries classify any foreign-born individual that has lived in the country for at least one year as an immigrant, while the duration of stay required for an individual to be referred to as an immigrant in some other countries may be two years. A third issue relates to the definition of the country of origin. Considering that several immigrants have obtained citizenship of countries different from where they were born, the question that arises is "should their countries of origin be captured based on where they were originally born or where they have subsequently lived and acquired citizenship?" While these concerns are valid, they are difficult to deal with, especially considering that most researchers rely on data from secondary sources such as the UN and the World Bank database, and the studies which utilise the data can make little (or no) impact regarding the issues. Additionally, there is a good chance that illegal migration can still be indirectly linked to the factors analysed in the econometric model.

2.2.4 Hypotheses

Based on the review of literature, the following hypotheses have been developed

Hypothesis 1: Global migration flow is not resistant to economic gravitational force. This suggests that the migration flow between two countries will increase as the population sizes of both origination and destination countries increase; and the longer distance between the country pair decreases the migration potential between the pair.

Hypothesis 2: Migration relating to continental and regional channels are also resistant to the economic forces of gravity. This proposition is based on the gravity hypothesised expectation in hypothesis 1.

Hypothesis 3: Economic factors play more significant roles (compared to non-economic factors) in driving migration flow at global and continental levels. This is based on the proposition that immigration is dominated by economic immigrants who are mainly seeking better economic opportunities.

2.3 Data and Empirical Framework

Having reviewed the literature on the theoretical and empirical perspectives on the application of the gravity framework to migration economics in the previous sub-section, this section discusses the data, methods and the empirical techniques adopted in this study.

2.3.1 Data Sources

As stated in the previous section, it is very difficult to access reliable and harmonised data on homogenous global international migration for a wide array of countries (Ramos and Surinach, 2013; Abel and Sander, 2014). This study has therefore sourced for high-quality data from different reliable sources in order to strengthen the empirical evidence and insight.

Contemporary migration studies have used migration data from the World Bank Bilateral Migration Database (see Ozden et al, 2011; Ramos and Surinach, 2013). This database is of very high standard and contains wide coverage. Despite containing data for more than 200 countries from 1960 to 2010, it still has several limitations. One of the limitations is that the data is aggregated at 10 yearly time periods with the potential to prevent the observation of variations in shorter time periods. Another issue is that the last data point recorded in the dataset is for the period 2000 to 2010, which creates a lag of 8 years (2010-2018). Additionally, this dataset measures migration using migration stock rather than migration flows and as established in the previous section, the use of migration stock is not ideal and should be avoided where possible. Migration flow data in this study has therefore been sourced

from the United Nations Population Division[12] which contains 5-yearly bilateral migration flow data covering the period 1990-2015 (25 years).

As discussed in the previous section, the gravity model framework requires the gravity indicators-distance and population size of both origin and destination countries; as well as other control factors. These explanatory and control variables have been pooled mainly from two sources: CEPII (Centre d'Etudes Prospectives et d'Informations Internationales[13]) and the World Bank database. Specifically, the distance, common official language, common colonial history and contiguity have been sources from CEPII, while data relating to population, male/female ratio, life expectancy rate, GDP and employment rate have been sourced from the World Bank databank. Details of the composition and transformation of these variables will be discussed in the subsequent sub-section. The CEPII data has been used in several gravity model studies (see for example, Kim and Cohen, 2010; and McAllister and Nanda, 2016) to obtain data such as distance, official languages and colonial relationships; while the World Bank databank provides economic information such as population size, male/female ratio, employment rate, life expectancy and GDP per capita.

2.3.2 Data: Variable Construction and Transformation

The different variables used in this study have been transformed and reconstructed to fit-in the gravity model framework. Each of these will be briefly discussed.

Migration Flow (*MF*) is the outcome variable which captures a total of 198 countries (a total of 39,204 pairs per year) with 5 yearly intervals (e.g. 1990-1995, 1995-2000, 2000-2005, 2005-2010 and 2010-2015), making a total of 196,816 bilateral migration pair for the 5 time periods[14].

[12] This dataset is the supplementary dataset in Abel, 2018. The scholar used this unique dataset to study the variations in migration flows by gender (see Abel, 2018 for details of the dataset).
[13] Translated from French to English "Research Centre in International Economics".
[14] This data is aggregated from mid-year of the first 5 years (e.g. 1990) to midyear of the next 5th year (e.g. 1995).

While distance and population sizes are the key elements of the gravity model framework, the model is enhanced by the introduction of other economic and non-economic control variables which are generally related to different migration push and pull forces (as discussed in section 2.2). The list and categories of the explanatory variables and controls are shown in Table 2.1.

Note, both 5-yearly aggregates as well as annual figures for the control variables are used. The use of 5-yearly aggregate can be justified as migration flow and most of the controls do not show very high year-to-year dispersion.

Table 2.1: Categories of Explanatory and Control Variables

Factors	Push Forces	Pull forces
Economic Gravity indicators	-	Distance
	Population size (origin)	Population size (destination)
Geographic	-	*Contiguity (common border)*
Demographic	*Male/female ratio (origin)*	*Male/female ratio (destination)*
	Life expectancy (origin)	*Life expectancy (destination)*
Social, Historic and Cultural	-	*Common official language*
	-	*Common colonial history*
Economic	*GDP (Origin)*	*GDP (destination)*
	Employment rate (origin)	*Employment rate (destination)*

Source: *Authors' Computation (2019), adapted from Praussello, 2011; Ramos and Surinach (2013)*

Distance (*d*) measures the distance (kilometres) between a pair of countries weighted to take the geographical distance between the two capital cities into account. The actual distance between two countries is transformed into logarithms in order to normalise the values which originally have a large variance. This variable generally remains constant for each country pair over the 5 time periods because geographical distance does not change with time. The variable controls for the effect of space on and proximity on migration flows. The theoretical expectation in a gravity model framework is that distance will negatively affect the migration flow between countries. Thus, it is expected that the law of distance decay will apply- suggesting that the farther two countries are from each other, the lower the migration flow between them.

Population (*p*) is the key indicator of the size of the two countries in a pair and this variable estimates the effects of the population size of both the origin and destination country on migration flow. The migration flow data is in 5 yearly periods, and the population data in the World Bank databank is collected annually. Therefore, the annual population data is aggregated into 5-yearly averages after which logarithms are taken to normalise the values. For the countries where data is only available for a few years out of the 5 years in one-time period, the aggregate is based on the number of years for which data is available. It is expected that the population of the migration origin and destination countries would positively affect migration flow, suggesting that the larger the population of the migration origination and destination country, the larger the migration flow between the two countries will be.

Male/female ratio (*mfr*) is a demographic variable that captures the percentage of the male population in a country relative to the female population. It is expected that the effect of this variable will be positive for the origin country and the destination country, premised on the idea that men more likely to be active migrants than women.

Life expectancy (*lex)* measures the number of years that an individual is expected to live at birth in any given country. This variable measures the quality of life and the health care system in a country, and it is sometimes used as a socio-economic indicator. It is expected that a higher life expectancy rate in the origination country will have a negative effect on migration flow, while having a positive effect in the destination country.

Contiguity (***ctg***) is a dummy variable conditioned to 1 if two countries are adjacent to each other or if two countries share a geographical border; and 0 if they do not. All things being equal, the gravity framework hypothesises that country pairs sharing common boundaries would have a higher volume of migration flow. The fact that a country is close to the border naturally makes immigrants more likely to consider that country as a migration destination.

Common official language (*ofl*) is a dummy variable indicating if two countries share a common official language. It is expected that the effects of this variable would be positive since language differences are likely to also capture a range of cultural and institutional variations.

Common colonial history (*clh*) is a dummy variable indicating if two countries have a colonial history. It controls for the likelihood of legacy effects, common institutional frameworks and other linkages that may result from a shared colonial relationship. This is expected to have a positive effect on migration flow between a pair of countries.

GDP per capita (*gdp*) captures the real gross domestic product of the destination country as a share of the GDP of the origin country. It is calculated by weighing the GDP per-capita of the destination country as a fraction of the GDP of the origin country and taking the logarithms of the product. Accounting for this factor controls for the wealth variation between the migration origination and destination countries, and also measures purchasers' capacity in both origin and destination countries in a gravity framework. The expectation is that a wider positive gap between the destination and origin country should increase migration flow from the origin country to the destination.

Employment rate (*emp*) measures the employment rate of the origin and destination countries as both push and pull factors. It is expected that a higher employment rate will lead to a decrease in migration flow from the country of origin and increase migration flow to the destination country.

These control variables have been carefully selected. However, the study is limited to the highlighted control variables because of the lack of data for some other control variables, and the poor quality of data in some cases. For instance, data on transparency, corruption rating, remittances, literacy rate, educational attainment, legal system, accountability, political stability and the rule of law, either have short time series or have a lot of missing cells (in the World Bank databank) hence they are not included in the modelling. A second issue relates to multicollinearity. For instance, the age dependency ratio

variable is correlated with life expectancy rate at 81%; while the share of land area between the two countries is highly correlated with the population of both the origin and destination country at a rate of 53%. It is therefore necessary to omit some of the variables with high correlation (see Appendix 2.1 for the correlation matrix).

As stated earlier, this study merged data from three sources, and this merger also created other data-related issues. One of the key issues is that each of the datasets has a different set and combination of countries. For instance, the UN data on migration flow captures the migration flow of 198 countries; the CEPII dataset captures the attributes of 224 countries; and the World Bank databank captures the macroeconomic characteristics of 265 countries. This implies that there are certain countries that will not be mutual to the three datasets. This is compounded by the fact that some of the countries are unique to only one of the three databases. After reconciling the country list on the three datasets, a total of 182 countries are common to the three datasets (total of 33,124 pairs, and the number of country pairs increases to 165,621 for the 5 time periods). A total of 912 unilateral pairs were also dropped[15] which leaves a total of 164,710 observations. Furthermore, the employment rate variable recorded several missing observations, hence a total of 159,280 observations are "eligible" for analysis. Suffice to state that due to some missing cells in some other variables, some of the observations are dropped by the modelling software due to the missing observations in the employment variable[16].

Table 2.2: Summary and Descriptive Statistics

Variable name	Variable Description	N	Mean	SD
Migration flow	Migration flow between origin and destination country (flow+1.5)	164,710	1093.201	17625
Log Migration Flow	Log of (migration flow+1.5)	164,710	1.57	2.28
Distance	Log of the distance between the origin and destination country	164,710	8.77	0.77
Log Population (Origin)	Log of the population of the origin	164,710	6.37	1.95
Log Population (destination)	Log of the population of the destination	164,710	6.37	1.95
Contiguity	Binary variable: 1=if country pair share a common border; 0 =otherwise	164,710	0.02	0.13
Male/Female ratio (origin)	The percentage of males compared to females in the origin country	164,710	49.92	2.91
Male/Female ratio (destination)	The percentage of males compared to females in the destination country	164,710	49.92	2.91
Life expectancy (origin)	The life expectancy rate in the origin country	164,710	67.88	9.67
Life expectancy (destination)	The life expectancy rate in the destination country	164,710	67.88	9.67

[15] These unilateral pairs (e.g. China to China migration) have been dropped because they will add no value to the study as it is impossible for an origin and destination country to be the same.
[16] 154,000 are utilised by the modelling software (stata).

Common Official Language	Binary variable: 1=if country pair share a common language; 0 =otherwise	164,710	0.15	0.36
Common Colonial History	Binary variable: 1=if country pair share a common colonial history; 0 =otherwise	164,710	0.11	0.11
GDP share	Log of GDP share of the destination country relative to origin country	164,710	-9.00	2.95
Employment rate (origin)	The employment rate in the origin country	159,280	57.66	11.66
Employment rate (destination)	The employment rate in the destination country	159,280	57.66	11.66

2.3.3 Empirical Framework and Methods

The gravity model on migration is theoretically represented by a random utility maximisation (RUM) model. The RUM estimates the utility that a migrant (*m*) derives from migrating to a specific country (*j=1*) compared to the utility derived from migrating to a different country (*j=2…..j*). The migrant obtains some level of utility from each choice, and as a random utility maximiser, the migrant will select the country with the highest perceived utility. Because utility is an ordinal measure, there is the need to know which choices derive more utility, and the measure of utility which is derived from each country choice is determined by the characteristics of the migrant's country of origin

$$U_{mj} = U(\boldsymbol{x}_{im}), \forall\ j \text{ in } J \tag{2.1}$$

where U_{mj} is the utility from alternative j for migrant m and x_i a set of migration pull and push forces which influence the migration choices of the migrant m.

The major econometric procedures have been discussed in the literature review section. Based on the review, this study begins by using the traditional practice in previous literature which usually entails the transformation of the measure of migration (migration flow), taking the natural logarithms and estimating the log-linear model using Ordinary Least Squares (OLS) estimation methods. With this approach, the "zero values" issue and heteroscedasticity are given special consideration particularly because 55% of the total bilateral migration flow used in this study have zero values with a potential to bias estimates derived from in the model. In dealing with this, a positive value of 1.5 is added uniformly to all the values of the country pair bilateral migration flow; after which the natural

logarithms of the new variables are taken (similar to the application in Ramos and Surinach, 2013 and McAllister and Nanda, 2016).

In addressing the issues associated with the first approach, an alternative approach- the Poisson pseudo-maximum-likelihood (PML) is adopted and this approach becomes the primary empirical estimation technique which this study adopts. The Poisson specification is built around the observed volume of migration between two countries with a conditional mean that is a function of multiple characteristics (see Linders et al., 2008). Thus, the efficiency of the PML estimator borders on the log-linear link function that estimates efficiently in the face of heteroscedasticity.

In an OLS regression, the migrants' flow choice *E(Y)* is explained as a function of a set of explanatory variables:

$$E(Y) = \lambda = \exp(\beta_1 + \beta_2 x) \tag{2.2}$$

and the destination choice defines the Poisson regression model

The parameters $\beta_1 + \beta_2$ are maximum likelihood estimations. In practice, maximum likelihood estimation is carried out by maximizing the logarithm of the likelihood function

$$\ln L(\beta_1, \beta_2) = \ln P(Y = y_1) + \ln P(Y = y_2) + \ln P(Y = y_3) \ldots\ldots = \ln P(Y = y_n) \tag{2.3}$$

Using eqn (2.2) for λ, the log of the probability function is

$$\ln[P(Y = y)] = \ln\left[\frac{e^{-\lambda}\,\lambda^{y}}{y!}\right] = -\lambda + y \ln(\lambda) - \ln(y!) = -\exp(\beta_1 + \beta_2 x) + y \times (\beta_1 + \beta_2 x) - \ln(y!) \tag{2.4}$$

Given a sample of *N*, the log-likelihood function becomes

$$\ln L(\beta_1, \beta_2) = \sum_{i=1}^{N} \{-\exp(\beta 1 + \beta_2 x_i) + y_i \times (\beta 1 + \beta_2 x_i) - \ln(y_i!)\} \tag{2.5}$$

The log-likelihood function becomes a product of only of β_1 and β_2 when the data values (y and x) are substituted and this function is still a non-linear function of the unknown parameters. The maximum likelihood estimates will therefore be obtained using numerical methods.

In order to control for time-variant unobserved heterogeneity and multilateral resistance to migration, migration country (origin and destination) and time-fixed effects (5 yearly time periods) are introduced. The first approach entails a separate variable approach where the country and time fixed effects are introduced separately, while the second approach substitutes the first approach with the introduction of migration origin-year and destination-year fixed effects to mean-difference out the multilateral resistance to migration (similar to Anderson and van Wincoop, 2003, 2004; and McAllister and Nanda, 2016)[17]. This approach also serves as a control mechanism for key factors (such as civil unrest, economic recession in some countries and prosperity in some other countries) in both origin and destination countries[18].

To reiterate, the bilateral migration flow ($LnMF_{ijt}$) between country pairs (origin county i and destination country j) in period t is proportional to the population of both the origin country (P_{it}) and destination country (P_{jt}), and inversely related to the distance between them (d_{ij}). This effectively makes migration flow the dependent variable; and the main explanatory variables population size and distance.

Using OLS estimation, the econometric specifications take form:

$$Log(Migration\ Flow_{ijt}) = \beta 0 + \beta_1\ Log(Distance_{ijt}) + \beta_2\ Log(Population\ size_{it}) + \beta_3\ Log(Population\ size_{jt}) + \beta_4\ Log(GDP_{jt}/\ GDP_{it}) + \beta_5\ (Employment\ rate_{it}) + \beta_6\ (Employment\ rate_{jt}) + \beta_7\ (Male/female\ ratio_{it}) + \beta_8\ (Male/female\ ratio_{jt}) + \beta_9\ (Life\ expectancy_{it}) + \beta_{10}\ (Life\ expectancy_{jt}) + \beta_{11}\ (Contiguous) + \beta_{12}\ (Common\ language) + \beta_{13}\ (Colonial\ history) + fixed\ effects + u_{ijt} \quad (2.6)$$

[17] The controls for common shocks in origin and destination country while also accounting for invariant unobserved heterogeneity; while the second approach takes the form of interacting the countries with the year indicators (*i.e.* migration origin*time dummies; and migration destination*time dummies) which accounts for the possibility that any positive or negative change in the bilateral barriers may generally pull immigrants to certain countries (or discourage them from choosing some countries as destinations).

[18] Ideally, these are factors that should be accounted for, but because of the data issues mentioned earlier, these data cannot be incorporated in the models.

Using Poisson maximum likelihood estimation:

$$Migration\ Flow_{ijt} = \beta 0 + \beta_1\ Log(Distance_{ijt}) + \beta_2\ Log(Population\ size_{it}) + \beta_3\ Log(Population\ size_{jt}) + \beta_4\ Log(GDP_{jt}/\ GDP_{it}) + \beta_5\ (Employment\ rate_{it}) + \beta_6\ (Employment\ rate_{jt}) + \beta_7\ (Male/female\ ratio_{it}) + \beta_8\ (Male/female\ ratio_{jt}) + \beta_9\ (Life\ expectancy_{it}) + \beta_{10}\ (Life\ expectancy_{jt}) + \beta_{11}\ (Contiguous) + \beta_{12}\ (Common\ language) + \beta_{13}\ (Colonial\ history) + fixed\ effects + u_{ijt} \quad (2.7)$$

Where:

$Migration\ Flow_{ijt}$ =immigration flow from country *i* (origin) to country *j* (destination) at time *t*

$Log(Migration\ Flow_{ijt})$ =log of immigration flow from country *i* (origin) to country *j* (destination) at time *t*

$Log(Distance_{ijt})$ =log of distance between country *i* (origin) to country *j* (destination)

$Log(Population\ size_{it})$ =log of the population of country *i* (origin) at time *t*

$Log(Population\ size_{jt})$ =log of the population of country j (destination) at time *t*

Contiguity = share a common geographical land border (1=YES/0=NO)

$(Male/female\ ratio_{it})$ =the male/female ratio for country *i* (origin) at time *t*

$(Male/female\ ratio_{jt})$ =the male/female ratio for country *j* (destination) at time *t*

$(Life\ expectancy\ rate_{it})$ =the life expectancy rate for country *i* (origin) at time *t*

$(Life\ expectancy\ rate_{jt})$ =the life expectancy rate for country j (destination) at time *t*

Common language = share a common official language (1=YES/0=NO)

Common colonial history = shared a common colonial history (1=YES/0=NO)

$Log(GDP_{ijt})$ =log of share of the GDP of country j (destination) compared to country i (origin) at time period t = $log\left(\frac{GDPj}{GDPi}\right)$

$(Employment\ rate_{it})$ =the employment rate for country *i* (origin) at time *t`*

$(Employment\ rate_{jt})$ =the employment rate for country *j* (destination) at time *t*

u_{ijt} = the random error term.

2.4 Empirical Results

This section presents the result from the empirical analysis carried out. The first sub-section shows the analysis of global migration flow which gives a global perspective; while the second sub-section shows the analysis of the various directions of regional and continental migration flows. The third section focuses on the various direction of migration flow relating to OECD countries. The OECD migration is a special interest in the empirical section based on descriptive and empirical evidence that OECD countries are the major destination countries of global immigrants (as discussed in chapter one). The final sub-section reports the various robustness checks and sensitivity analysis that have been carried out to access the robustness of the models and the results, as well as to examine the scope of the application of the models.

It is expected that regardless of continental and regional dynamics, global migration and other channels of migration should be non-resistant to the economic forces of gravity- distance should negatively influence migration (controlling for migration cost), while a higher population in both countries of origin and destination should boost migration flow even after controlling for other economic and non-economic factors.

2.4.1 Global Migration

The estimations in this sub-section are based on equations (2.6) and (2.7) and the gravity model results are presented in Table 2.3. Columns 1-4 show the results using OLS estimators and the outcome variable for these models is the log of migration flow (log{flow +1.5}). This estimator is used to build up the model in order to analyse the effect of the control variables and to derive the base model. Column 1 presents the OLS results without country and time fixed effects; while column 2 introduces country fixed effects into the model. In column 3, time fixed effects are introduced into the models. However, as argued in Sections 2.3 and 2.4, there is a need to control for multiple resistance to migration (*MRM*); thus, in column 4, the interaction between migration origination country and year,

and migration destination country and years replace the country and time fixed effects in the previous models, and this forms the base OLS model. In column 5, the Poisson model PML estimator is adopted based on the base model in column 4 and the outcome variable becomes migration flow (flow+1.5). The model specification in column 5 is identical to column 4, though different estimators (PML) and slightly different outcome variables are used.

Table 2.3: Base Models (Migration flow): OLS and PML

	OLS				PML
	(1)	(2)	(3)	(4)	(5)
VARIABLES	All Controls	Countries FE	Time FE	MRM	MRM
Log Distance	-0.705***	-0.826***	-0.826***	-0.762***	-0.986***
	(0.00700)	(0.00940)	(0.00940)	(0.00873)	(0.0384)
Log Population (Origin)	0.287***	0.980***	1.000***	0.293***	0.683***
	(0.00279)	(0.0408)	(0.0457)	(0.00414)	(0.0311)
Log Population (destination)	0.254***	-0.744***	-0.722***	0.275***	0.719***
	(0.00280)	(0.0433)	(0.0494)	(0.00398)	(0.0324)
Contiguity	1.798***	1.764***	1.764***	1.773***	1.222***
	(0.0412)	(0.0734)	(0.0734)	(0.0740)	(0.0890)
Male/Female ratio (origin)	0.0483***	-0.0132***	-0.0143***	0.0487***	0.00890
	(0.00172)	(0.00366)	(0.00366)	(0.00242)	(0.0161)
Male/Female ratio (destination)	-0.0419***	0.0193***	0.0181***	-0.0657***	0.0864***
	(0.00172)	(0.00337)	(0.00339)	(0.00289)	(0.0125)
Life expectancy (origin)	0.0311***	0.00991***	0.0126***	0.0379***	-0.00635
	(0.000584)	(0.00212)	(0.00231)	(0.000809)	(0.0107)
Life expectancy (destination)	0.0549***	-0.0168***	-0.0142***	0.0629***	0.0177***
	(0.000574)	(0.00218)	(0.00239)	(0.000815)	(0.00464)
Common Official Language	0.780***	0.571***	0.571***	0.714***	0.541***
	(0.0146)	(0.0169)	(0.0169)	(0.0166)	(0.0720)
Common Colonial History	1.965***	1.025***	1.025***	1.550***	1.472***
	(0.0479)	(0.0810)	(0.0809)	(0.0797)	(0.0926)
GDP share	0.0850***	-0.00441*	-0.00401*	0.111***	0.189***
	(0.00198)	(0.00226)	(0.00227)	(0.00318)	(0.0265)
Employment rate (origin)	-0.00129***	-0.0117***	-0.0123***	-0.00162**	-0.0138**
	(0.000454)	(0.00188)	(0.00190)	(0.000660)	(0.00550)
Employment rate (destination)	0.00532***	0.0192***	0.0187***	0.0118***	0.0259***
	(0.000454)	(0.00190)	(0.00192)	(0.000675)	(0.00611)
Constant	-1.507***	4.980***	4.554***	-2.628***	-8.397***
	(0.148)	(0.405)	(0.560)	(0.271)	(1.652)
Observations	154,000	154,000	154,000	154,000	154,000
R-squared	0.300	0.524	0.524	0.468	0.586
Country of origin FE	NO	YES	YES	NO	NO
Country of destination FE	NO	YES	YES	NO	NO
Year FE	NO	NO	YES	NO	NO
Country of origin x year FE	NO	NO	NO	YES	YES
Country of destination x year FE	NO	NO	NO	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

MRM: Multiple resistance to migration control models

The results in Table 2.3 show that regardless of the different econometric specifications, controls and estimators, the law of distance decay applies to global migration i.e. distance tends to reduce migration flow, and this is statistically significant across models. The results further show that a higher population in the origin and destination countries increase global migration. The positive and statistically significant effect of the population of the origin country is also consistent across models. It is however interesting to note that while this effect is also positive for the destination country in the first model specification, it becomes negative when country and time fixed effects are introduced as separate control variables. However, with the control for multiple resistance to migration (column 4), the results become positive and statistically significant, suggesting that the previous results may have been influenced by omitted variable bias and multiple resistance to migration. In all, the PML (column 5) which is the primary estimator for the analysis in this study also supports the previous results which indicate that global migration is not resistant to the economic forces of gravity. This result is expected (based on studies such as Kim and Cohen, 2010 and Grogger and Hanson, 2011). However, the positive coefficient for the population of the destination country is deviant from the negative effects which was observed by Ramos and Surinach (2013). Ramos and Surinach (2013) interpret the negative effect which they observe as limitations arising from capacity constraints of the destination country.

The feedback from the control variables are mixed. As expected, the results show that migration flow is higher between countries that share the same physical border (contiguity). For demographic factors, having a higher male to female ratio in both origin and destination countries increases migration flow, but this is statistically insignificant for the origin country suggesting that this does not matter much. The results also show that a higher life expectancy rate in the origin country reduces emigration (although this is statistically insignificant), while a higher life expectancy rate in the destination country increases immigration. Considering that this factor also measures the quality of life in a country (Kim and Cohen, 2010), it can be inferred that a higher quality of life in the origin country reduces emigration while a higher quality of life in the destination country increases immigration. The

feedback from the demographic factors suggest that demographic pull forces (relating to destination countries) are stronger than the push factors (relating to origin countries) because the push factors are both statistically insignificant, while the pull factors are both statistically significant.

The historic and socio-cultural factors appear to be consistent with theoretical constructs (see Clark et al., 2007; Mayda, 2005). The results show that having a common official language and colonial history increases migration flow between a country pair. For the economic factors, the results also appear consistent with expectation. The results reveal that the larger the size of the economy of the destination country (as a share of the size of the economy of the origin country), the more migration flow will occur between the two countries. This is will even be more pronounced for economic migrants who will typically select destination countries that offer them better economic opportunities. In similar vein, a migration origin country is more likely to experience a reduced emigration if the employment rate is higher, while a destination country is more likely to experience increased immigration if the employment rate is higher. These patterns suggest that economic push and pull forces are strong determinants of global migration flow.

The results from the analysis in table 3 therefore provide empirical support to the proposition that global migration flow is not resistant to economic gravitational force, and that geographic, demographic, historic and economic factors are also key in defining the current global migration patterns in a gravity framework.

2.4.2 Continental Channels of Migration

Having tested the resistance of global migration flow to the economic forces of gravity, it is also essential to further analyse this at continental levels. All the models in this sub-section are estimated using the PML poison models with controls for multiple resistance to migration (identical to the specification in column 5, table 2.3) and they all model bilateral migration flows (as outcome variable).

Table 2.4a shows the channels of migration flow within each continent. The table estimates the economic gravitational forces of migration for migration that occurs within the six World continents. For instance, if migration occurs within two countries that are in the same continent (e.g. France to Germany) it is considered as migration within Europe and reported in Column 4. Column 1 shows the global migration flow as reported in column 5 table 2.3 and it serves as the basis of comparison for the within-continent migration flows.

Table 2.4a Within continents: PML

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	World	Africa	Asia	Europe	North America	Oceania	South America
Log Distance	-0.986***	-1.181***	-1.404***	-0.978***	<-0.001	-1.820***	-0.885***
	(0.0384)	(0.113)	(0.0795)	(0.0655)	(0.188)	(0.244)	(0.245)
Log Population (Origin)	0.683***	0.478***	0.210	0.505***	0.751***	0.233	0.731**
	(0.0311)	(0.112)	(0.141)	(0.126)	(0.0534)	(0.211)	(0.360)
Log Population (destination)	0.719***	0.748***	0.872***	0.986***	-0.359*	0.0891	-0.575
	(0.0324)	(0.127)	(0.195)	(0.140)	(0.205)	(0.496)	(0.449)
Contiguity	1.222***	2.170***	1.663***	0.576***	2.403***	#	1.106***
	(0.0890)	(0.200)	(0.157)	(0.118)	(0.301)		(0.239)
Male/Female ratio (origin)	0.00890	0.492**	0.278**	0.539**	-0.139	-2.056***	-0.718
	(0.0161)	(0.242)	(0.118)	(0.227)	(0.181)	(0.559)	(0.480)
Male/Female ratio (destination)	0.0864***	-0.202	-0.137**	0.201	0.124	0.607	-3.319***
	(0.0125)	(0.307)	(0.0578)	(0.183)	(0.237)	(0.419)	(1.148)
Life expectancy (origin)	-0.00635	-0.0955***	-0.232**	-0.119	0.276***	-0.0804	0.349***
	(0.0107)	(0.0231)	(0.116)	(0.0976)	(0.0203)	(0.0847)	(0.115)
Life expectancy (destination)	0.0177***	-0.165***	0.110*	0.0935	0.112***	0.260**	-0.326*
	(0.00464)	(0.0328)	(0.0605)	(0.0860)	(0.0427)	(0.117)	(0.174)
Common Official Language	0.541***	0.173	0.128	0.836***	-0.528***	3.639***	2.616***
	(0.0720)	(0.161)	(0.209)	(0.152)	(0.157)	(0.267)	(0.356)
Common Colonial History	1.472***	-0.0509	4.498***	0.954***	1.553***	1.101***	#
	(0.0926)	(0.439)	(0.342)	(0.139)	(0.273)	(0.339)	
GDP share	0.189***	-0.0288	0.627***	0.572***	0.896***	-0.666**	4.718***
	(0.0265)	(0.0535)	(0.221)	(0.201)	(0.102)	(0.271)	(1.436)
Employment rate (origin)	-0.0138**	0.0186	0.144***	0.0826***	-0.0540*	-0.124***	0.0496
	(0.00550)	(0.0143)	(0.0375)	(0.0253)	(0.0299)	(0.0226)	(0.0998)
Employment rate (destination)	0.0259***	-0.0508***	-0.0389	-0.0828***	0.00619	-0.455***	0.177
	(0.00611)	(0.0147)	(0.0289)	(0.0274)	(0.0291)	(0.123)	(0.147)
Constant	-8.397***	24.22	6.817	-18.71*	-15.58	105.9**	240.0***
	(1.652)	(15.34)	(4.924)	(9.841)	(11.80)	(42.67)	(87.60)
Observations	154,000	12,250	9,460	7,410	1,900	450	660
R-squared	0.586	0.755	0.841	0.692	0.998	0.985	0.857
Country of origin x year FE	YES	YES	YES	YES	YES	YES	YES
Country of destination x year FE	YES	YES	YES	YES	YES	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*
#Contiguity: Most of the countries in Oceania (column 6) are Islands hence they do not share a common border.
#Common colonial history: None of the countries in South America (column 7) have a shared colonial link.

The results in table 2.4a indicates that the migration within continents is also susceptible to the economic forces of gravity. The results show a negative and statistically significant effect of distance on global migration, and a positive and statistically significant effect of both origin country and destination country population sizes on migration flow. The distance effect appears to be strongest for migration that originated and terminated within Oceania and Asia; and the effect appears to be weakest for migration that originated and terminated within North America (it is statistically insignificant); while the effect of population size appears strongest in Africa and Europe; and weakest in Oceania where both origin and destination population sizes are statistically insignificant. Contiguity also consistently plays a positive and statistically significant role in driving within-continent migration flow.

The demographic factors are however different across continents. For male to female ratio of the origin countries, migration within Africa, Asia and Europe have similar effects (this patter is similar to the World models, although statistically insignificant in the World model); while the other continents record negative effects, even though this is only statistically significant in Oceania. For the male to female ratio in the destination country, Europe, North America and Oceania have the same effects as the World model (although these effects are statistically insignificant in the continental models while significant in the World models). Africa, Asia and South America however show negative effects although this is not significant in the African model. For life expectancy, the results are also mixed for both origin and destination factors. The negative effect in the origin country is consistent across all continents (though statistically insignificant in Europe and Oceania), apart from North America and South America where the effects are positive and statistically significant. For the destination country, the effect is also consistently positive across continents (though not significant in Europe), apart from Africa and South America where the effect is negative and statistically significant. For the demographic factors, the effects are weakest in Europe, and this may be linked to the liberalised

migration policy within the EU which makes demographic factors less of a concern for EU migrants when compared to economic and geographic factors.

For historic and socio-cultural factors, having a common official language maintains the positive effect across continents (although statistically insignificant in Africa and Asia), apart from North America where the effect is negative and statistically significant. Having a common colonial history also positively drives migration flow within continents apart from Africa where it is negative and insignificant. It is obvious that the historic factors, specifically common official language and common colonial history, do not matter much for migration within the African continent. This may be because the colonial territories were split within tribes and ethnic groups hence, different colonial masters controlled different parts of the same tribe. Thus, contiguity, as expected, plays a more significant role than historic factors, and so do socio-cultural factors; although some socio-cultural factors cannot be adequately accounted for in this analysis due to data-associated challenges.

For economic factors, the GDP share remains positive and significant across most continents, apart from Oceania where this is negative and Africa where it is also negative but statistically insignificant. The employment rates at both origin and destination countries generally have different impact on the within-continent migration flow when compared to the effects observed in the World model. This pattern suggests that economic factors are not as influential in driving migration within Africa as they are in other continents.

Generally, the results in panel A of table 4 indicate that apart from the economic forces of gravity and contiguity, the different economic and non-economic factors have varying effects and degrees of impact on within-continent migration, and these generally also vary from the World migration patterns observed. It should be noted that these variations are more pronounced for economic factors than for non-economic factors.

Table 2.4b takes the analysis further by analysing the migration flow that originated from one continent and terminated in a different continent.

Table 2.4b- Migration from the continent (origin) to other Countries outside the Continent: PML

VARIABLES	(1) World	(2) Africa	(3) Asia	(4) Europe	(5) North America	(6) Oceania	(7) South America
Log Distance	-0.986***	-1.320***	-1.048***	-0.733***	-0.586***	-1.091***	-0.747***
	(0.0384)	(0.0869)	(0.0691)	(0.0645)	(0.129)	(0.127)	(0.124)
Log Population (Origin)	0.683***	0.702***	0.377***	0.734***	0.941***	0.672**	0.729***
	(0.0311)	(0.0897)	(0.0810)	(0.136)	(0.175)	(0.297)	(0.224)
Log Population (destination)	0.719***	0.645***	0.787***	0.596***	0.472***	0.699***	1.000***
	(0.0324)	(0.0638)	(0.0485)	(0.0512)	(0.0617)	(0.0903)	(0.0775)
Contiguity	1.222***	1.644***	1.495***	0.331**	0.872***	-0.259	1.172***
	(0.0890)	(0.183)	(0.139)	(0.134)	(0.172)	(0.348)	(0.236)
Male/Female ratio (origin)	0.00890	0.351**	0.0580	0.787***	0.240	-0.642*	2.747**
	(0.0161)	(0.141)	(0.0481)	(0.136)	(0.920)	(0.384)	(1.128)
Male/Female ratio (destination)	0.0864***	0.0154	0.0824***	-0.378***	-0.371***	-0.161	-0.706***
	(0.0125)	(0.0274)	(0.0206)	(0.0530)	(0.0854)	(0.118)	(0.0987)
Life expectancy (origin)	-0.00635	-0.102***	-0.0864	-0.157***	0.158*	0.0221	0.152***
	(0.0107)	(0.0187)	(0.0658)	(0.0580)	(0.0864)	(0.0323)	(0.0557)
Life expectancy (destination)	0.0177***	0.0139*	0.0850***	0.0397***	0.0528***	0.0921***	0.146***
	(0.00464)	(0.00819)	(0.00896)	(0.0121)	(0.0174)	(0.0226)	(0.0165)
Common Official Language	0.541***	0.942***	0.364***	1.266***	-0.171	1.700***	2.092***
	(0.0720)	(0.125)	(0.119)	(0.162)	(0.182)	(0.323)	(0.211)
Common Colonial History	1.472***	1.266***	1.397***	1.481***	0.750**	-0.391	0.0649
	(0.0926)	(0.170)	(0.159)	(0.114)	(0.297)	(0.266)	(0.361)
GDP share	0.189***	0.0515	0.275***	0.221***	0.189***	0.136*	0.367***
	(0.0265)	(0.0377)	(0.0222)	(0.0305)	(0.0501)	(0.0752)	(0.0469)
Employment rate (origin)	-0.0138**	-0.0391***	0.0694**	0.0243	-0.0438	0.00330	-0.0591
	(0.00550)	(0.0123)	(0.0317)	(0.0280)	(0.0385)	(0.0690)	(0.0512)
Employment rate (destination)	0.0259***	0.0317***	0.0405***	0.0115	0.0401***	-0.000732	0.0706***
	(0.00611)	(0.0119)	(0.00992)	(0.0110)	(0.0130)	(0.0259)	(0.0162)
Constant	-8.397***	-8.344	-11.78**	-4.254	-3.554	36.26*	-110.9*
	(1.652)	(7.388)	(4.985)	(7.175)	(43.10)	(19.79)	(60.87)
Observations	154,000	43,750	38,500	34,125	17,500	8,750	10,500
R-squared	0.586	0.529	0.673	0.591	0.964	0.952	0.720
Country of origin x year FE	YES	YES	YES	YES	YES	YES	YES
Country of destination x year FE	YES	YES	YES	YES	YES	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

In Table 2.4b, distance maintains its negative effect, while population in both origin and destination countries have positive and statistically significant effects. Contiguity is also generally consistent with the World pattern, apart from Oceania where this is negative and statistically insignificant. For other demographic factors, male to female ratio in both origin and destination country has mixed results in terms of statistical significance, but generally consistent with the World pattern in the origin country

and inconsistent with the global pattern in the destination country. Life expectancy in the origin country is also mixed, but consistently positive and statistically significant in destination country.

For historic and socio-cultural factors, common official language is positive in most continents and this is in tandem with the World trend, but negative and statistically insignificant in North America. Common colonial effects are also mixed though mainly consistent with global trends and significant across continents. The economic factors are mixed, although generally consistent with global patterns.

Table 2.4c provides further insight on migration flow in the opposite direction of table 2.4b- migration that originates from a country outside a particular continent but ends up in the continent. The modelling and reporting format are identical to Table 2.4b.

Table 2.4c:Migration from other parts of the World (origin) to the continents (destination): PML

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	World	Africa	Asia	Europe	North America	Oceania	South America
Log Distance	-0.986***	-1.230***	-1.386***	-0.760***	-0.299	-1.525***	-0.907***
	(0.0384)	(0.0973)	(0.0742)	(0.0508)	(0.186)	(0.158)	(0.170)
Log Population (Origin)	0.683***	0.633***	0.995***	0.705***	0.545***	0.589***	0.583***
	(0.0311)	(0.0628)	(0.0863)	(0.0320)	(0.0443)	(0.0637)	(0.0545)
Log Population (destination)	0.719***	0.741***	0.690***	0.890***	1.090***	-0.00181	1.540***
	(0.0324)	(0.102)	(0.143)	(0.0663)	(0.194)	(0.221)	(0.246)
Contiguity	1.222***	2.079***	1.307***	0.432***	2.097***	0.198	0.926***
	(0.0890)	(0.206)	(0.136)	(0.122)	(0.342)	(0.394)	(0.254)
Male/Female ratio (origin)	0.00890	0.0523***	0.0469	-0.00426	0.0938***	0.127***	0.0303
	(0.0161)	(0.0162)	(0.0348)	(0.0128)	(0.0241)	(0.0394)	(0.0209)
Male/Female ratio (destination)	0.0864***	-0.238	0.0667	-0.116	1.381***	0.362	0.632
	(0.0125)	(0.296)	(0.0425)	(0.114)	(0.248)	(0.255)	(0.827)
Life expectancy (origin)	-0.00635	-0.0293**	-0.0131	0.0692***	0.106***	0.110***	0.0844***
	(0.0107)	(0.0130)	(0.0175)	(0.00802)	(0.0152)	(0.0192)	(0.0153)
Life expectancy (destination)	0.0177***	-0.200***	0.0533	0.179***	0.137***	0.291***	0.0639
	(0.00464)	(0.0328)	(0.0324)	(0.0317)	(0.0372)	(0.0343)	(0.0491)
Common Official Language	0.541***	0.538***	0.400**	1.020***	0.274*	1.246***	2.147***
	(0.0720)	(0.144)	(0.168)	(0.0975)	(0.152)	(0.277)	(0.163)
Common Colonial History	1.472***	1.471***	3.039***	1.168***	0.535*	1.477***	-0.390
	(0.0926)	(0.302)	(0.202)	(0.0955)	(0.289)	(0.251)	(0.390)
GDP share	0.189***	-0.298***	0.0754	0.263***	0.555***	0.105	-0.258***
	(0.0265)	(0.105)	(0.0987)	(0.0444)	(0.0765)	(0.114)	(0.0877)
Employment rate (origin)	-0.0138**	0.0615***	-0.0263**	-0.0181***	-0.0101	-0.0121	0.0293***
	(0.00550)	(0.00949)	(0.0117)	(0.00437)	(0.00877)	(0.0180)	(0.0108)
Employment rate (destination)	0.0259***	-0.0679***	-0.0771	-0.0262*	0.125***	-0.166***	-0.247***
	(0.00611)	(0.0148)	(0.0474)	(0.0150)	(0.0272)	(0.0592)	(0.0585)
Constant	-8.397***	18.89	2.211	-4.731	-97.99***	-26.82**	-40.43
	(1.652)	(14.47)	(7.120)	(4.975)	(12.25)	(13.08)	(44.98)

Observations	154,000	43,750	38,500	34,125	17,500	8,750	10,500
R-squared	0.586	0.673	0.738	0.623	0.963	0.985	0.782
Country of origin x year FE	YES	YES	YES	YES	YES	YES	YES
Country of destination x year FE	YES	YES	YES	YES	YES	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

The results in table 2.4c confirm the results in tables 2.4a and 2.4b. Again, distance and population of origin country remain as expected; however, population of destination country, while consistent across continents is in variance in Oceania where it is negative but statistically insignificant suggesting that the population of the country of origin does not matter when considered in the context of immigration from other parts of the world to the Oceania continent. Contiguity remains positive across models. Demographic factors are mixed but largely consistent with global trends. The historic and socio-cultural factors are also generally consistent and as expected. Common official language is consistent across continents; while common colonial history is also consistent across continents and in tandem with the global patterns, though a variance can be observed in South America. Economic factors are generally mixed and largely inconsistent with global patterns.

2.4.3 OECD (Organisation for Economic Co-operation and Development) Migration

Having tested the resistance of global migration flow to the economic forces of gravity at global and continental level, this section aims to deepen perspectives on the application of the gravity framework to other global blocs. The OECD is a unique global bloc and has particularly become a major subject of scholarly debates relating to migration. The relationship between the OECD and migration can be linked to the migration flow patterns- world migrants moving from non-OECD countries to OECD countries. OECD countries are therefore by far the largest destination of global immigrants (OECD, 2017). For instance, approximately 10% of the adult population in OECD countries are immigrants (OECD, 2011 and Docquier, Ozden and Peri, 2014) compared to 3% for the general immigration proportion in other countries (Duru and Trenz, 2017). Scholars relate this trend to worsening economic conditions in non-OECD countries and better economic conditions in OECD countries which is a classic for migration push-pull disequilibrium.

It will therefore be valuable to deepen insight on the application of this framework to OECD countries in order to stress-test the scope of application of the framework. Table 2.5 examines migration flow within the OECD bloc, from the OECD to other non-OECD countries, and from non-OECD countries to the OECD countries. All the models in this sub-section are estimated using the Poisson PML models with controls for multiple resistance to migration (identical to column 5 in table 2.3).

Table 2.5- OECD Migration Flow: PML

	(1)	(2)	(3)	(4)
VARIABLES	World	OECD to OECD	OECD to non-OECD	Non-OECD to OECD
Log Distance	-0.986***	-0.494***	-0.411***	-0.751***
	(0.0384)	(0.0691)	(0.0722)	(0.0490)
Log Population (Origin)	0.683***	1.226***	1.351***	0.672***
	(0.0311)	(0.255)	(0.224)	(0.0273)
Log Population (destination)	0.719***	0.948***	0.568***	1.019***
	(0.0324)	(0.186)	(0.0434)	(0.0887)
Contiguity	1.222***	1.439***	1.404***	0.712***
	(0.0890)	(0.145)	(0.161)	(0.134)
Male/Female ratio (origin)	0.00890	-0.113	-0.434	0.0557***
	(0.0161)	(0.468)	(0.348)	(0.0140)
Male/Female ratio (destination)	0.0864***	-0.776	-0.327***	-0.00161
	(0.0125)	(0.552)	(0.0548)	(0.310)
Life expectancy (origin)	-0.00635	-0.0394	-0.174	0.0775***
	(0.0107)	(0.158)	(0.111)	(0.00718)
Life expectancy (destination)	0.0177***	-0.194**	0.0386***	-0.220***
	(0.00464)	(0.0849)	(0.0108)	(0.0252)
Common Official Language	0.541***	-0.0451	0.247*	0.628***
	(0.0720)	(0.133)	(0.138)	(0.0867)
Common Colonial History	1.472***	0.552***	0.691***	1.126***
	(0.0926)	(0.136)	(0.145)	(0.100)
GDP share	0.189***	0.309	0.225***	0.319***
	(0.0265)	(0.542)	(0.0263)	(0.0387)
Employment rate (origin)	-0.0138**	0.0900	0.141**	-0.0113**
	(0.00550)	(0.0774)	(0.0659)	(0.00485)
Employment rate (destination)	0.0259***	0.115	0.0169*	0.171***
	(0.00611)	(0.0932)	(0.00906)	(0.0332)
Constant	-8.397***	46.09**	43.99***	3.739
	(1.652)	(22.28)	(16.21)	(13.47)
Observations	154,000	6,300	31,500	31,500
R-squared	0.586	0.864	0.815	0.768
Country of origin x year FE	YES	YES	YES	YES
Country of destination x year FE	YES	YES	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

The results in Table 2.5 show that migration relating to OECD countries is also not resistant to the economic forces of gravity and this is consistent regardless of the direction of flow- within the OECD, from the OECD to non-OECD countries, and from non-OECD countries to OECD countries. It specifically shows that distance decreases OECD-related migration flow, and population size increase the migration flow. The results also show that sharing a common border increases OECD- related migration flow and this is also regardless of the direction of flow.

For demographic factors, the results are mixed. The results show that having a high male/female ratio does not matter for migration within the OECD and from OECD to non-OECD countries. It is however positive and statistically significant for migration from non-OECD countries to OECD countries. In terms of destination however, having a higher male/female ratio negatively impacts migration flow and this is statistically significant for migration from OECD countries to non-OECD countries. A higher life expectancy rate in the origin country does not matter much for migration within the OECD and from OECD to non-OECD countries, but this is positive and statistically significant in migration from non-OECD to OECD countries. The statistical insignificance observed for the life expectancy variable for OECD to OECD migration may be because all OECD countries have higher quality of life, hence this factor may not be a major consideration in the decision of individuals from OECD countries to migrate to other OECD countries. The results are however mixed for the destination country. The results show that a higher life expectancy rate at the destination country reduces migration within OECD and from non-OECD to OECD migration. It however increases migration from OECD to OECD countries.

For historic and socio-cultural factors, having a common official language does not matter for migration within the OECD, but this is positive and significant for both OECD to non-OECD and non-OECD to OECD migration (similar to global migration). Common colonial history is positive and statistically significant for the OECD-related migration and this is also consistent with the global trend.

For economic factors, having a higher GDP share of the destination country compared to the origin country increases migration flow, and this is at a higher rate than the global models. For employment rate at the origin country, migration from non-OECD to OECD countries is negative and significant which is similar to the result for the global models. These effects are positive in OECD to OECD migration and OECD to non-OECD migration, but only significant in OECD to non-OECD migration. The effect is however positive for the employment rate at the destination country, although this does not matter for OECD to OECD migration.

These results show that OECD-related migration has different patterns from the general global migration models and further variations exist based on the direction of the migration flow. However, the economic gravitational force remains important.

2.4.4 Robustness test

Despite the carefully developed modelling framework adopted, further tests are carried out to examine the robustness of the results in this study. There is the possibility that the gravity model results may be driven by some outlier countries- countries with very high immigration and high emigration rates. To test for the sensitivity of the potential biases that these "outlier countries" may cause, the countries in question are excluded from the base model in steps. First, the first five countries which received the highest number of global immigrants are excluded from the sample (results are reported in Table 2.6a). After this, the first five countries with the highest emigration rates are also excluded in (in steps) in separate models (reported in Table 2.6b)[19]. In Table 2.6a, column 1 shows the base model (similar to table 2.3 column 5), while columns 2 to 6 show the results from the stepwise exclusion of key immigration destination countries.

Table 2.6a: PML Models excluding top-5 Immigrant Destination Countries

	(1)	(2)	(3)	(4)	(5)	(6)

[19] The data on the ranking of immigration destinations and emigration origin countries have been obtained from the Migration Data Portal (2019).

VARIABLES	World					
Log Distance	-0.986***	-1.105***	-1.118***	-1.120***	-1.113***	-1.184***
	(0.0384)	(0.0352)	(0.0371)	(0.0378)	(0.0382)	(0.0346)
Log Population (Origin)	0.683***	0.722***	0.723***	0.712***	0.738***	0.729***
	(0.0311)	(0.0344)	(0.0360)	(0.0370)	(0.0369)	(0.0389)
Log Population (destination)	0.719***	0.677***	0.705***	0.701***	0.681***	0.685***
	(0.0324)	(0.0345)	(0.0375)	(0.0393)	(0.0404)	(0.0411)
Contiguity	1.222***	1.152***	1.349***	1.418***	1.508***	1.547***
	(0.0890)	(0.0920)	(0.0905)	(0.0901)	(0.0897)	(0.0938)
Male/Female ratio (origin)	0.00890	0.00506	0.00762	0.00315	0.00190	0.00199
	(0.0161)	(0.0164)	(0.0173)	(0.0180)	(0.0177)	(0.0187)
Male/Female ratio (destination)	0.0864***	0.0840***	0.0924***	0.101***	0.0944***	0.0966***
	(0.0125)	(0.0125)	(0.0131)	(0.0134)	(0.0130)	(0.0131)
Life expectancy (origin)	-0.00635	-0.00888	-0.0141	-0.0152	-0.0207**	-0.0280**
	(0.0107)	(0.00978)	(0.00998)	(0.0100)	(0.0102)	(0.0111)
Life expectancy (destination)	0.0177***	0.0318***	0.0324***	0.0403***	0.0446***	0.0484***
	(0.00464)	(0.00477)	(0.00496)	(0.00510)	(0.00530)	(0.00546)
Common Official Language	0.541***	0.718***	0.673***	0.711***	0.700***	0.663***
	(0.0720)	(0.0800)	(0.0806)	(0.0827)	(0.0828)	(0.0856)
Common Colonial History	1.472***	1.533***	1.667***	1.629***	1.358***	1.388***
	(0.0926)	(0.0930)	(0.0964)	(0.0967)	(0.112)	(0.104)
GDP share	0.189***	0.149***	0.139***	0.137***	0.131***	0.164***
	(0.0265)	(0.0277)	(0.0289)	(0.0308)	(0.0312)	(0.0337)
Employment rate (origin)	-0.0138**	-0.00627	-0.00457	-0.00677	-0.00463	-0.00884*
	(0.00550)	(0.00476)	(0.00502)	(0.00496)	(0.00477)	(0.00518)
Employment rate (destination)	0.0259***	0.0213***	0.0273***	0.0337***	0.0353***	0.0337***
	(0.00611)	(0.00626)	(0.00674)	(0.00706)	(0.00703)	(0.00639)
Constant	-8.397***	-7.400***	-3.473**	-5.431***	-10.18***	-9.537***
	(1.652)	(1.561)	(1.654)	(1.615)	(1.574)	(1.617)
Observations	154,000	152,250	150,510	148,780	147,060	145,350
R-squared	0.586	0.520	0.559	0.566	0.564	0.620
Excluded Countries		*USA*	*USA* *Germany*	*USA* *Germany* *Saudi Arabia*	*USA* *Germany* *Saudi Arabia* *Russia*	*USA* *Germany* *Saudi Arabia* *Russia* *UK*
Country of origin x year FE	YES	YES	YES	YES	YES	YES
Country of destination x year FE	YES	YES	YES	YES	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

The results in Table 2.6a indicate that the base model is robust (there are no major changes to the signs of the coefficients) despite changes to the sample composition. However, the results show some minor deviation in terms of the magnitude of effects as well as in statistical significance in some instances. For instance, the life expectancy rate in the origin country which showed an insignificant effect in the base model becomes significant when Russia is excluded, and this significance is also maintained (the effect becomes stronger) when the UK is further excluded from the countries in the sample. This may indicate that if immigrants choose to migrate to the less popular destination countries, push factors

may play a stronger role than if they were to migrate to a popular immigrant destination country. The results also show that for employment rate relating to the origin country, the magnitude of the effect is weaker when the first sets of the key destination countries are excluded; however, this becomes significant when the UK (rated the fifth global migration destination) is further excluded. Another variation is that the life expectancy rate in the destination country is also a stronger determinant of migration flow, particularly if immigrants migrate to countries that are not key migrant destinations. It can be further observed that the model fit increases in models where all key destination countries are excluded, suggesting that the modelled variables are stronger predictors of migration flow to less popular migration destination countries compared to other destinations in general.

Table 2.6b reports the model with the step-wise exclusion of countries with higher levels of emigration. Column 1 of table 2.6b shows the base model (similar to table 2.3 column 5), while columns 2 to 6 show the stepwise exclusion of key emigration origin countries. In column 7, countries that have experienced some form of war or major violence spells are excluded from the model. This is to account for the possibility that the results may be driven by political migration. In classifying the war-affected countries, all countries that have experienced any form of wars in the 25 years of the observation period are excluded regardless of when the war began[20]. This approach has been adopted because it is difficult to measure the magnitude of the crises before and after each war, and to further determine when migration would have intensified before and after the war.

Table 2.6b: PML Models excluding top-5 Emigrant Origin and War-affected Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	World						
Log Distance	-0.986***	-0.976***	-0.989***	-0.961***	-0.949***	-0.959***	-1.050***
	(0.0384)	(0.0377)	(0.0369)	(0.0376)	(0.0376)	(0.0377)	(0.0407)
Log Population (Origin)	0.683***	0.673***	0.671***	0.679***	0.698***	0.685***	0.679***
	(0.0311)	(0.0317)	(0.0315)	(0.0366)	(0.0371)	(0.0364)	(0.0403)
Log Population (destination)	0.719***	0.728***	0.724***	0.795***	0.801***	0.792***	0.724***
	(0.0324)	(0.0324)	(0.0325)	(0.0356)	(0.0367)	(0.0366)	(0.0369)

[20] The list of countries excluded are Guatemala, Columbia, Peru, Algeria, Ivory Coast, Nigeria, Iraq, Angola, DRC, Somalia, Eritrea, Afghanistan, Philippines, Iran, Libya, Iraq, Egypt, Yemen, Bahrain, Tunisia (list sourced from Relief Web, 2009).

Contiguity	1.222***	1.164***	0.989***	1.073***	1.141***	1.080***	1.075***
	(0.0890)	(0.0896)	(0.0941)	(0.0989)	(0.101)	(0.102)	(0.0938)
Male/Female ratio (origin)	0.00890	0.0105	0.0103	0.0123	0.0118	0.0130	0.0357*
	(0.0161)	(0.0166)	(0.0162)	(0.0168)	(0.0165)	(0.0149)	(0.0203)
Male/Female ratio (destination)	0.0864***	0.0760***	0.0749***	0.0909***	0.0890***	0.0883***	0.106***
	(0.0125)	(0.0123)	(0.0123)	(0.0127)	(0.0126)	(0.0125)	(0.0141)
Life expectancy (origin)	-0.00635	-0.00542	-0.00451	-0.00424	-0.00740	-0.00596	0.0706***
	(0.0107)	(0.0107)	(0.0106)	(0.0108)	(0.0112)	(0.0113)	(0.0149)
Life expectancy (destination)	0.0177***	0.0146***	0.0148***	0.0108**	0.0118**	0.0121**	-0.0625***
	(0.00464)	(0.00469)	(0.00464)	(0.00487)	(0.00488)	(0.00490)	(0.0106)
Common Official Language	0.541***	0.592***	0.695***	0.672***	0.655***	0.673***	0.482***
	(0.0720)	(0.0708)	(0.0719)	(0.0729)	(0.0744)	(0.0760)	(0.0776)
Common Colonial History	1.472***	1.435***	1.453***	1.470***	1.291***	1.270***	1.480***
	(0.0926)	(0.0928)	(0.0897)	(0.0907)	(0.102)	(0.105)	(0.106)
GDP share	0.189***	0.180***	0.174***	0.164***	0.163***	0.166***	0.616***
	(0.0265)	(0.0278)	(0.0275)	(0.0300)	(0.0300)	(0.0303)	(0.0679)
Employment rate (origin)	-0.0138**	-0.0150***	-0.0140***	-0.0127**	-0.0109*	-0.0105*	-0.0213***
	(0.00550)	(0.00546)	(0.00537)	(0.00558)	(0.00566)	(0.00566)	(0.00598)
Employment rate (destination)	0.0259***	0.0246***	0.0239***	0.0269***	0.0280***	0.0301***	-0.000592
	(0.00611)	(0.00593)	(0.00589)	(0.00631)	(0.00635)	(0.00647)	(0.00668)
Constant	-8.397***	-11.17***	-2.267	-4.419**	-9.628***	-4.679**	2.501
	(1.652)	(1.591)	(1.919)	(1.985)	(1.619)	(1.937)	(1.744)
Observations	154,000	152,250	150,510	148,780	147,060	145,350	122,460
R-squared	0.586	0.611	0.462	0.484	0.462	0.376	0.656
Excluded Countries		*India*	*India* *Mexico*	*India* *Mexico* *China*	*India* *Mexico* *China* *Russia*	*India* *Mexico* *China* *Russia* *Syria*	*War-affected countries (only)*
Country of origin x year FE	YES	YES	YES	YES	YES	YES	YES
Country of destination x year FE	YES	YES	YES	YES	YES	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

The results in table 2.6b also confirms the general robustness of the gravity framework. Some variations are however also observed, particularly in the model where the war-affected countries are excluded (column 7). The results in column 7 show that having a higher male/female ratio has a negative impact on migration flow and this is significant (as opposed to being positive and statistically insignificant in the other models in columns 1-6), while the effect of the life expectancy rate in the destination country is negative and significant (this is positive and significant in models from columns 1-6). It is also interesting to note that the effect of the origin country's GDP as a share of the designation countries GDP increases by about six times more than in the other models (columns 1-6). Furthermore, the employment rate in the destination country does not appear to matter. It is also worthy of note that the model fit becomes weaker as countries with high emigration rate are excluded. However, the model

fit significantly increases in the model which excludes war-affected countries, suggesting that the models are better predictors of emigration from countries that have experienced relative political stability.

As an additional robustness test, further allowance is made for a more granular variation in time series. Considering that some of the key explanatory variables are in yearly time series (the World Band dataset), the data is reconstructed to account for the yearly variation in the predictor variables. In achieving this, the model is developed with the specification which is identical to the base model (Table 2.3a column 5) and the 5-yearly migration flow data is converted into yearly flow as the predictor variable. Furthermore, annual time series data is used for the time-varying explanatory variables such as population, male to female ratio, life expectancy, GDP share and employment rates rather than the previous 5-yearly aggregated data[21]. The results are reported in Table 2.7. Column 1 shows the base result which column 2 shows the yearly time-series data results.

Table 2.7: PML Models using Yearly Time-series data

	(1)	(2)
VARIABLES	Five-yearly time-series	Yearly time-series
Log Distance	-0.986***	-0.749***
	(0.0384)	(0.0141)
Log Population (Origin)	0.683***	0.567***
	(0.0311)	(0.0114)
Log Population (destination)	0.719***	0.587***
	(0.0324)	(0.0116)
Contiguity	1.222***	1.534***
	(0.0890)	(0.0408)
Male/Female ratio (origin)	0.00890	0.0594***
	(0.0161)	(0.00897)
Male/Female ratio (destination)	0.0864***	0.0692***
	(0.0125)	(0.00623)
Life expectancy (origin)	-0.00635	0.0824***
	(0.0107)	(0.00396)
Life expectancy (destination)	0.0177***	-0.0496***
	(0.00464)	(0.00307)
Common Official Language	0.541***	0.677***
	(0.0720)	(0.0335)
Common Colonial History	1.472***	1.465***
	(0.0926)	(0.0403)

[21] The also significantly increases the same size to 716,689

GDP share	0.189***	0.728***
	(0.0265)	(0.0173)
Employment rate (origin)	-0.0138**	-0.00607***
	(0.00550)	(0.00177)
Employment rate (destination)	0.0259***	0.0143***
	(0.00611)	(0.00239)
Constant	-8.397***	-14.15***
	(1.652)	(0.993)
Observations	154,000	716,689
R-squared	0.586	0.546
Country of origin x year FE	YES	YES
Country of destination x year FE	YES	YES

*Note: Robust Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1.*

The results in column 2, table 2.7 are generally consistent with the results in the base model (column 1). The signs of the coefficients in the base model (5 yearly time-series) are generally consistent with the signs of the coefficients in the annual time-series models[22]. There are however slight changes in the magnitude of effect, statistical significance and the model fit. For instance, the male to female ratio of the origin country which is statistically insignificant in the base model becomes significant in the yearly model. It is also worthy of note that the effect of the GDP share is more than six times stronger in the annual time-series model than in the base model. Furthermore, the coefficients in the annual time-series data are generally weaker than the base models, and the general model fit (r2) is slightly weaker in the annual time-series than in the base model. These suggest that short-term fluctuations in major drivers of migration do not matter as much as longer-term fluctuations; further suggesting that longer-term changes are better predictors of global migration flows.

The general results in section 2.4 confirm that migration does not "resist" the economic forces of gravity and this is consistent at global level, continental level, and OECD level, regardless of the direction of the migration flow. The results further show that economic and non-economic factors also

[22] The life expectancy variable however shows a rather odd variation in terms of the signs of the coefficients. While a higher life expectancy shows a negative effect in the origin country and a positive effect in the destination country, the inverse is the case in the yearly time-series model where the result is positive and negative respectively. This is counter-intuitive, and does it align with previous results, thus creating a potential for further examination.

play very important roles in defining global and continental migration flow, but these factors have varying effects.

2.5 Summary and Conclusion

Global migration trends and patterns have constantly featured in debates and research by policy makers and scholars. With the current increase in global migration, a key concern relates to the best techniques of estimating migration for forecasts and decision making (Ramos and Surinach, 2013). This study analyses global migration in a gravity framework in a form that has not been previously explored in literature.

The framework adopted in this study estimates the economic gravitational forces of global migration flow as a function of the population sizes of both origin and destination countries, and the distance between both countries. The study also estimates the economic gravitational force on migration flows and different directions of flows at continental level and for OECD-related migration. Other economic and non-economic factors (demographic, geographic, cultural, political and historic) are also accounted for in the study. This study utilised data which has been merged from three sources- the World Bank databank, CEPII, and the UN database (a supplementary dataset in Abel 2018). The merged dataset contains 182 countries and a total of 33,124 country pairs over five sets of 5-yearly time periods (1990-2015). In total, 154,000 observations were used for the empirical analysis (after dropping observations with missing values and unilateral migration flows).

Like many previous studies that analyse bilateral migration in a gravity model framework, this study contends with several econometric issues which have been approached in different ways. First, the study contends with zero data points in the migration flows which indicate no migration exchange between a country pair. A base model (OLS) is first adopted and this takes the form of adding a positive constant (1.5) to all the migration flow data after which natural logarithms are generated to become

the dependent variable. Having established from literature that the OLS may not be the most efficient estimator for dealing with this issue, an alternative estimator is adopted- the Poisson pseudo-maximum likelihood model, and this becomes the primary empirical estimator in the study. The pseudo-maximum likelihood (PML) in a Poisson model also has an added advantage of controlling for heteroscedasticity. Furthermore, the interaction of country and time fixed effects are introduced to control for unobserved heterogeneity and omitted variable bias which may arise from multilateral resistance to migration.

Based on the expectation from previous literature, the hypothesised effects are observed. The results generally suggest that global migration flow is not resistant to the economic forces of gravity. In other words, the larger sizes of both origin and destination encourage migration between the two countries, and shorter distance between a pair of countries further increases migration flow between the two countries. This effect is observed on a global scale, continental level as well as for OECD-related migration and the results are robust and consistently show the hypothesised effects. The results further indicate that contiguity consistently plays a positive role in migration flow which suggests that two countries that share the same geographical borders will likely experience a higher migration rate.

This study further provides valuable insight on the economic and non-economic factors which drive migration at global and continental levels. The results generally show that non-economic factors have more consistent results across global and continental models and these results are generally less volatile compared to economic factors (similar to the observation in Kim and Cohen, 2010). This is however with exception to demographic factors which have very inconsistent estimates. Economic factors also show a high level of variation across global and continental models. These variations provide support to the proposition that the various factors that drive migration will vary depending on the direction of flow and the continental variations.

This study has provided valuable insights on the economic gravitational forces which global migration and continental migration are susceptible to. It has also extended knowledge and the literature on the key effects of economic and non-economic factors on global migration. The insights obtained from this study are valuable for forecasting and projecting the direction of future migration flows which are vital tools for planning urban and regional growth, and for infrastructure and provision of amenities. This will also aid policy makers in policy formulation for international migration across multiple countries. Based on these insights, countries, regional and continental blocs should approach migration through bilateral and multilateral co-operation as a means of avoiding and managing migration crises.

The analysis of global migration patterns (particularly in section 2.4.4) reveals that the inclusion and exclusion of key migrant destination countries can have some effects on the gravity models of global migration. This therefore generates curiosity with regards to the mechanism of country-specific migration and therefore creates the need to conduct within-country and sub-national analysis of immigrants' pathways. The following empirical chapters of this thesis focus on the UK. The focus on the UK is mainly because it is a major migrant destination country and perhaps the country that has experienced the most remarkable changes to its migration policy systems in the last century. The issues surrounding Brexit and the resulting anecdotal debates also make a UK-based study even more relevant. The next chapters therefore focus on the residential and housing patterns of immigrants residing in the UK. These analyses begin by focusing on the link between migration policy and the housing patterns of immigrants. The next chapter therefore provides insight on country-level regional locational patterns of immigrants in the UK and how these patterns may be linked to migration policy evolution.

CHAPTER THREE

Do Migration Policies Affect the Locational Patterns of Immigrants? Evidence from the UK

3.0 Introduction

The previous chapter provided insight on global and continental migration patterns and examined the primary factors that are driving current global migration patterns. Whilst this global perspective is valuable, it is important to also explore other micro-level migration concerns. Because an immigrant's choice to migrate is also intrinsically accompanied with the decision on the choice of a residence (country, region/state, city and neighborhood), it becomes essential to analyse this locational decision, vis-à-vis migration policy framework.

This micro-level study is approached from a UK perspective based on the points expounded in chapter one. This chapter introduces the theme on the potential link between migration and the housing market of the destination country. The study begins by developing conceptual links between migration policy and the locational patterns of immigrants and goes further to empirically tests the propositions developed. This insight is relevant and important, particularly with current debates surrounding the implications of Brexit. While there are already existing theoretical links between migration policy and different aspects of immigrants' life courses, the major contribution of this study lies in the application of these theories and concepts to the context of urban and regional structures in ways that have not been previously explored.

In addressing the second research question of this thesis, this chapter analyses the mechanism through which changes in migration policy may alter the residential locational patterns of immigrants in the destination country. In achieving this, the following research objectives will be examined:

i. To develop a conceptual and theoretical link between migration policy and the locational patterns of immigrants;
ii. To analyse the variation in the locational patterns of immigrants who migrated under a liberalized migration policy system and the locational choices of immigrants that migrated

under a more restrictive framework;

iii. To examine the variation in the short-run and long-run effects of migration policy dynamics on urban and regional structures.

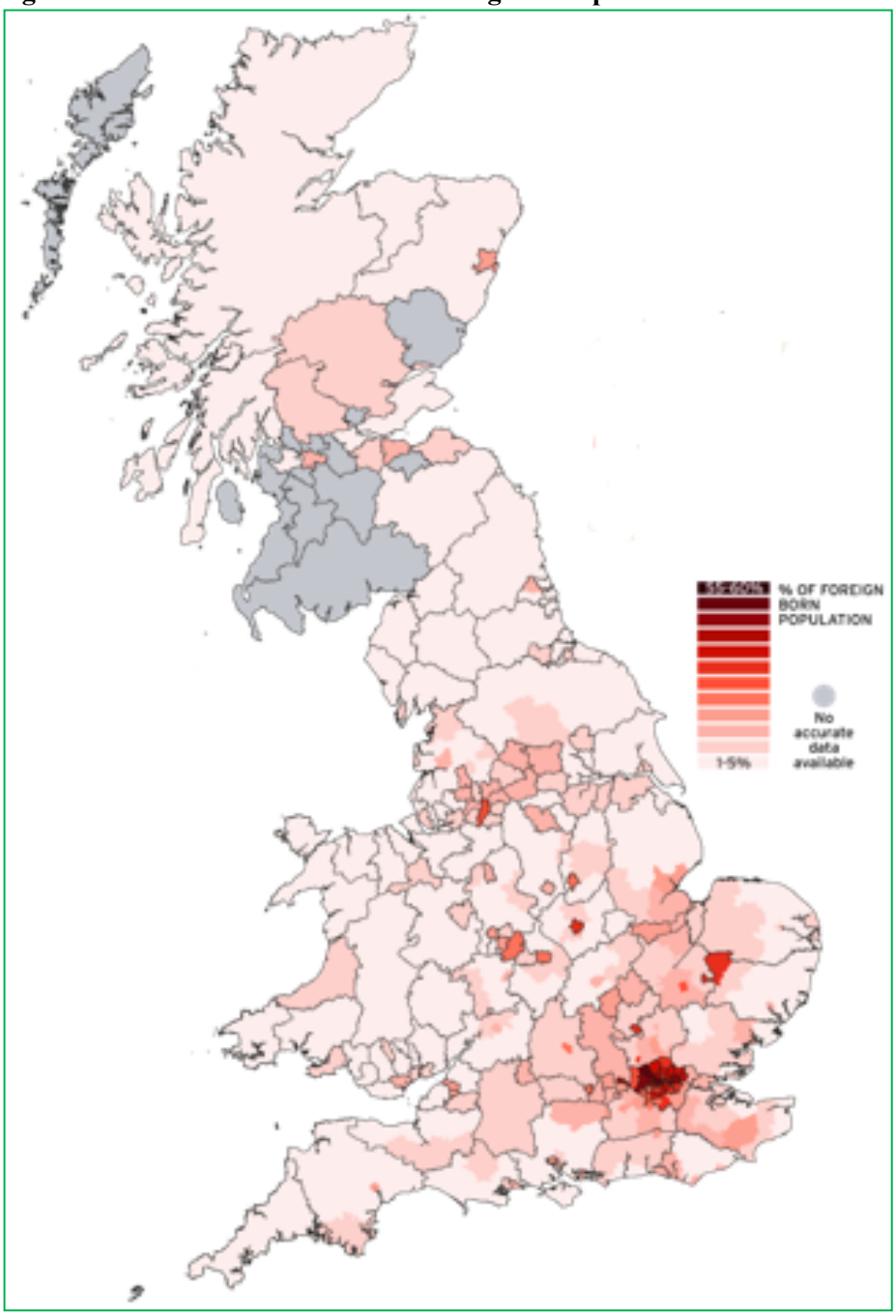
3.1 Background and Motivation of the Study

The United Kingdom, like other OECD countries, has attracted a large volume of immigrants from around the world over the last half-century, which happened in stages. The liberalisation of immigration for Commonwealth citizens[23] between 1948 and 1971, and subsequent migration liberalisation for EU citizens in 1993 set the stage for a heterogeneous UK population. Decisions surrounding residential location is one of the key issues that immigrants must address before they migrate, and this choice is typically a function of macro-level factors such as local and regional economies, demographics and socio-cultural structures; as well as more micro-level factors such as individual and household characteristics and social networks (Zavodny, 1999; Åslund, 2005; Tanis, 2018).

A variation exists in the regional distribution of immigrants across UK regions (Vargas-Silva and Rienzo, 2018) and distinct immigrant clusters can be observed in certain cities (Figure 3.1).

[23] Citizens from countries which are former and present British Colonies

Figure 3.1: The Distribution of the Immigrant Population in Great Britain

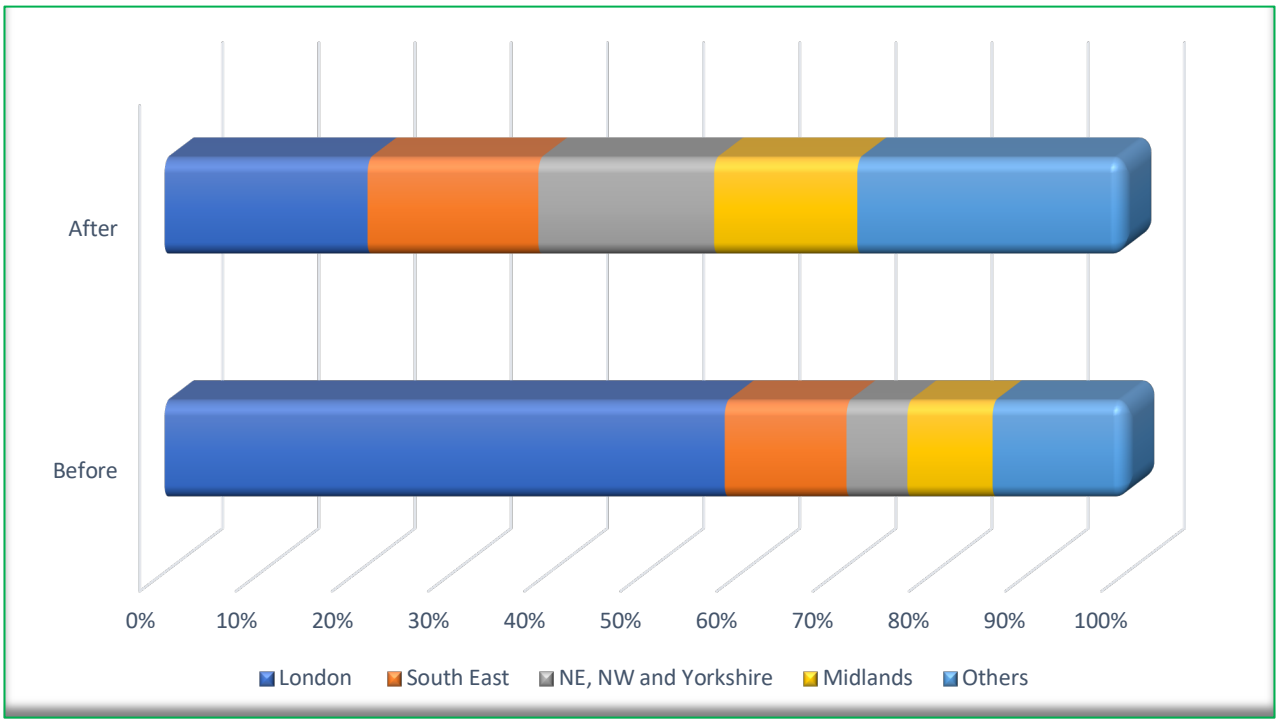


Source: Cocco and Endley, 2014, using ONS data.

Evidence further suggests that 50% of UK immigrants reside in London and one-third of London residents are immigrants (The Migration Observatory, 2017). The immigrant concentration in London (as shown in Figure 1.3) may be linked to the city's political and economic global relevance (Barber, 2013). This is further backed-up by literature (Åslund, 2005; Pew Research Centre, 2017; Tanis, 2018) which provide evidence that larger cities, economic hubs and immigrant clusters exert stronger migration pull forces. It is therefore, unexpected that immigrants from the EU 2004 accession countries

(EU-A10)[24] that migrated to the UK after 2004 are significantly less concentrated in London (Figure 3.2).

Figure 3.2: Locational Distribution of EU-A10 Immigrants (3 years before and after 2004)



Source: Author's drawing based on data from University of Essex, 2018.

The dramatic change in the locational distribution of EU-A10 immigrants immediately after the 2004 accession generates curiosity with regards to the potential link between migration policy changes, locational patterns and regional distribution of immigrants. Migration policy has been linked to the socio-economic, socio-cultural and demographic characteristics of immigrants; and the locational choices of immigrants have also been linked to these characteristics (Åslund, 2005; Ejermo and Zheng, 2018). It may therefore be valuable to empirically analyse the potential link between migration policy, waves of immigrants, and their locational patterns.

The impact of migration policy is indeed attracting enormous attention, with contributions to labour market, capital movement, trade, innovation, transportation, information technology, economic growth and development (see Dustman, 1997; Rosso, Reinzo and Portes, 2012; Nickell and Saleheen, 2017;

[24] The 10 new countries that joined the EU in 2004 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia)

Ejero and Zheng, 2018). However, there is insufficient robust empirical contribution to urban and regional economics. This research is therefore a significant contribution to the debate on the social and economic benefits and costs, directly or indirectly associated with migration policy systems, particularly as it relates to urban and regional economics. Estimating the impact of migration policy changes on locational patterns of immigrants has both theoretical and practical implications: from a theoretical perspective, models of locational choices are the crux of spatial economics; and from a practical viewpoint, decisions regarding locational choices have implications on housing consumption patterns, household wealth, wellbeing, welfare and public expenditure.

This study therefore analyses the potential link between liberalised and restrictive migration policy frameworks and the short-run and long-run locational patterns and regional distribution of immigrants by focusing on two major immigration waves to the UK: the EU-A10 and the Commonwealth immigration. The study employs a Regression Discontinuity Design (RDD) style approach to compare the locational choices of the immigrants that migrated in the three years preceding the policy implementation with those that migrated three years after the policy changes occurred using data available from 2009 to 2017. Furthermore, a Difference-in-Difference (DiD) approach is also incorporate to estimate the effect of being in the post-policy implementation group.

The insight from this research makes significant contribution to the current discourse on the impact of immigration on the local economy- a highly debatable topic across several major regions of the world. This unique insight may be further linked to labour market dynamics and transmission of economic shocks across geographies and financial systems; with implications on housing demand, rents, house prices and infrastructure. The findings in this study are further valuable for social cohesion and integration, as well as local and regional expenditure, planning, forecasting, and economic development.

3.2 Migration Policy Evolution in Britain

There are two distinct migration era in the UK: The Commonwealth/Windrush migration (1948 to 1971) and the EU migration (1993 to 2016).

3.2.1 The Commonwealth Migration Era

The first era- Commonwealth/Windrush started after the Second World War II in 1948 when Britain introduced a liberalized migration framework for Commonwealth immigrants (with unrestricted entry, work and settlement rights) to supplement the labour which was required for the massive infrastructural development in Britain sequel to the war. This migration liberalisation created an unprecedented wave of immigrants from the British colonies, particularly from Africa, Asia and the Caribbean. This liberalization soon attracted negative sentiments, as the Commonwealth immigrants increasingly depended on public welfare benefits and lived in deprived areas of squalor, poor housing conditions and high crime rates. The negative sentiments resulted in violence and civil unrest which led to a series of legislations notably the Commonwealth Immigration Acts of 1962 and 1968 (see Abrahámová, 2007 for more notes on these).

According to Abrahámová (2007), the 1968 Act was perceived as discriminatory because it created two classes of Commonwealth immigrants- belonging (older colonies) and non-belonging (newer colonies)[25]. However, these pieces of legislation failed to reduce immigration to the levels intended, thus, all immigration preferences for citizens of the Commonwealth were withdrawn with the introduction of the Immigration Act of 1971 which became effective in January 1972. These restrictions brought an end to the Commonwealth/Windrush immigration era.

The 1962, 1968 and 1971 policy changes are major reference points in the introduction of migration restrictions for Commonwealth citizens in the UK. However, the 1962 and 1968 policies were partial

[25] Granting superior rights to immigrants from countries with similar migration pull/push forces such as Australia, Canada and New Zealand who were older colonies

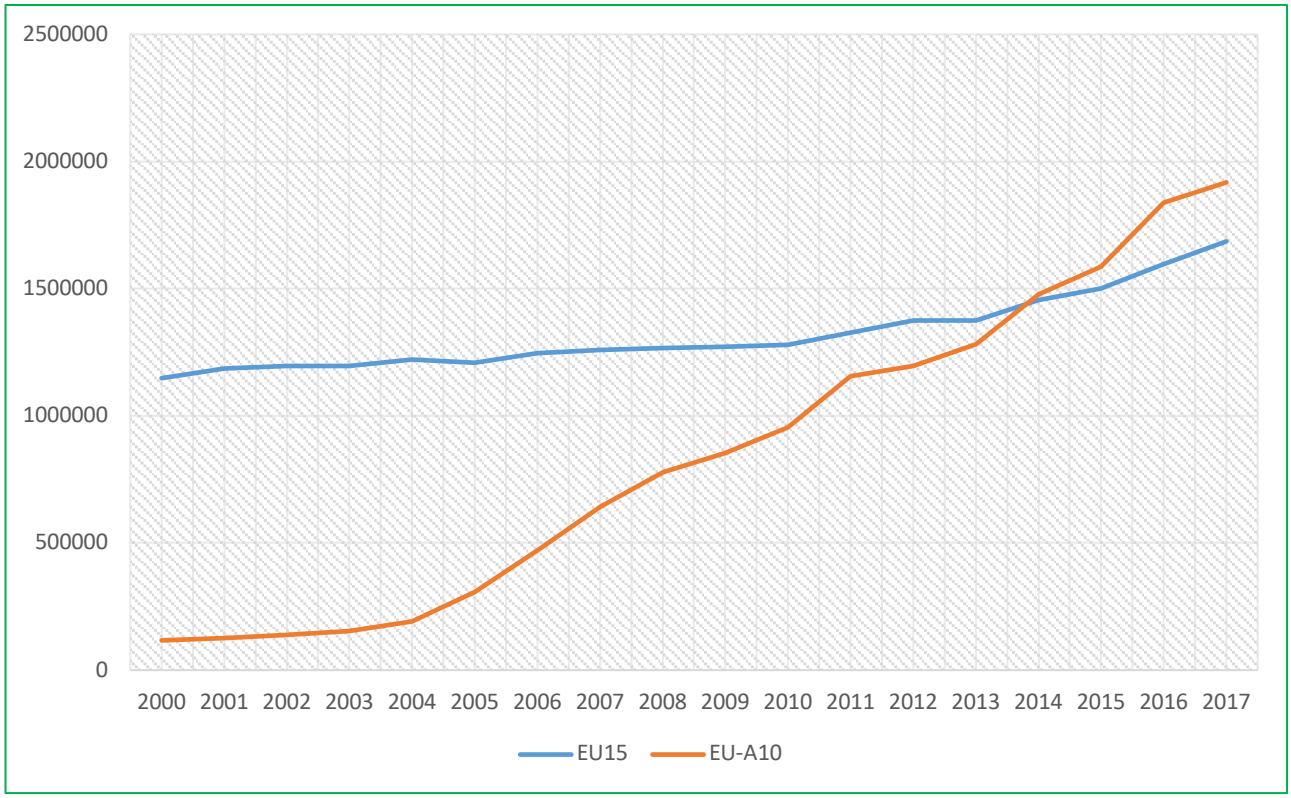
restrictions which will make it challenging to capture the impact of the policy changes. The 1971 Immigration Act on the other hand was more decisive and is generally regarded as the legislation that ended the Commonwealth/Windrush immigration wave. Based on this, the empirical analysis of the migration restriction component of this study will focus on the 1971 Act. This aspect of the study will also be valuable in providing insight on the potential impact of Brexit on housing, locational choices and residential patterns of immigrants that will migrate to the UK after the UK exits the EU.

3.2.2 The European Union (EU) Migration Era

The second migration era- the EU migration era which was the result of the UK's accession to the EU[26] in 1973 and the 1993 law on free movement within the EU, marked the beginning of another liberalised migration era in the UK. However, the 2004 accession is most remarkable mainly because of the significant increase in the rate of immigration from EU-A10 countries to the EU15 countries (older EU countries). This immigration rush was however anticipated mainly because of the high differences in income and standard of living between EU15 and A8[27] countries, and this created fears of a labour market over supply and social incohesion (Drinkwater et al., 2003). The EU15 countries (except for the UK, Ireland and Sweden) therefore maintained immigration restrictions for the A8 countries for a two-year period as a way of controlling the effect of the negative immigration selection. With the significant increase in the EU-A10 immigration to the UK after 2004 (as shown in Figure 3.3), the socio-economic composition of the immigrants became mixed, as majority of the immigrants were lower skilled workers (Migration Watch UK, 2015; Campbell, Cooper and Simmons, 2014). It is therefore appropriate to examine how this migration liberalisation changed the locational patterns and regional distribution of the new EU-A10 immigrants after 2004.

[26] This was known as the European Economic Commission (ECC) at the time.
[27] The A8/EU8 is the classification that excludes Malta and Cyprus (also referred to as EU A2) from the EU-A10 countries because Malta and Cyprus are of higher economic status.

Figure 3.3: Number of EU15 and EU-A10 Immigrants to the UK between 2000 and 2017



Source: *Author's drawing based on data from ONS 2017; in Vargas-Silva and Fernandez-Reino, 2018*

3.3 Conceptual Framework

Immigration has attracted enormous scholarly contribution over the last half century; however, the strand of literature relating to migration policy has been rather thin. Scholars provide valuable insights on the impact of migration policy on technology, innovation, social integration, labour market, economic growth and development. This area of research is however yet to be extended to residential patterns and urban structures, thus the difficulty of drawing a direct conceptual link from literature.

The conceptual framework developed in this study is premised on three main postulates: first, migration policy is the underlying mechanism for the selection of immigrants; second, migration policy changes tend to alter immigrant selection and the characteristics of immigrants; and third, the general characteristics of immigrants influence their locational patterns (Åslund, 2005; and Ejermo and Zheng, 2018).

Migration policy may be classified as restrictive (creating or expanding the scope of immigration requirements) or liberalised (relaxing or removing already existing immigration restrictions) (see Sjaastad, 1962; Bianchi, 2013; Ejermo and Zheng, 2018; and Partington, 2019). Liberalised migration is sometimes perceived as a viable tool for labour mobility, technological advancement, trade and development, and population and demographic balance; and sometimes criticised for creating weak border controls, labour market over-supply, increased pressure on public facilities and amenities, negative selection of immigrants and social inequality (see Borjas, 2001; Drinkwater et al., 2003; Abrahámová, 2007; and Ejermo and Zheng, 2018). Generally, liberalised migration has the tendency to create a socio-economic hybrid of immigrants (mix of high, mid and low socio-economic classes) with varied educational qualification, skills and technical abilities. This implies that the life pathways of immigrants under a liberalised immigration system may be more heterogeneous; with a high probability that this wave of immigration will be dominated by immigrants of lower and mid-socio-economic classes.

Restrictive migration policies, on the other hand, typically aim to control the immigration from certain nationalities by introducing entry requirements. It may entail expanding the scope of restriction to certain countries that were previously operating in a liberalized framework or imposing further immigration conditions and requirements for citizens of countries already operating in a restrictive framework. These restrictions are usually expected to ensure efficient selection of immigrants with higher skills, expertise or financial endowment. Thus, economic immigrants under a restrictive migration policy framework must meet certain educational or technical standards and will usually have to earn income above a set threshold. Migration restrictions thus typically create a wave of immigrants of high (or mid) socio-economic classes.

3.3.1 The Potential Link between Migration Policy and the Locational Choices of Immigrants

Research has focused largely on the link between migration, housing and spatial patterns in general.

However, the role of migration policy on the housing market has not been adequately explored. Saiz (2003, 2007) make contributions to the housing literature by linking immigration shocks to rents and house prices. Pavlov and Somerville (2018) also make a significant contribution to understanding immigration policy effects on the housing market by focusing on investment motive and foreign capital. However, these studies are not contextualised and driven by the primary migration policy frameworks which might have shaped the migration patterns being analysed.

Locational choices of individuals are theoretically linked to socio-economic factors, labour market forces, demographic factors, socio-cultural factors, individual tastes and preferences, regional and local economies, housing tenure and housing market conditions (Zavodny, 1999; Åslund, 2005; and Tanis, 2018). Having established in section 3.3.1 that migration policy plays a vital role in determining the socio-economic, demographic and socio-cultural composition of immigrants, it can be inferred that these policies may further influence the locational choices and regional distribution of immigrants.

3.3.2 Hypotheses

Based on the conceptual framework developed in the introduction and previous sub-sections, the following hypotheses are tested:

Hypothesis 1: Immigrants under a liberalized migration policy system are less likely to concentrate in London. This is based on the idea that the liberalized migration policies succeed in creating a wave of immigrants of heterogeneous socio-economic classes, with majority in the lower socio-economic group. As established in section 3.3.1, immigrants under a liberalised policy system should generally possess lower skill levels, thus a lower propensity to reside within big cities and regions where their skillset may not be at par. This may therefore push them to other cities and regions. Additionally, housing affordability challenges are more likely for this cohort which may further make a residential locational choice outside London more likely.

Hypothesis 2: Immigrants under a restrictive migration policy framework are more likely to be concentrated in London. This is premised on the proposition that restrictive policy systems succeed in creating a cohort of immigrants of higher socio-economic status (as established in section 3.3.1) and immigrants under this system should be more highly skilled and employed in better paying jobs, hence choose cities and regions where higher skilled labour is required and higher wages are obtainable. Furthermore, housing affordability issues should be less of a concern for the cohort in a restrictive policy system, as they can afford the high cost of housing.

Hypothesis 3: The impact of the migration policy framework on the locational choices of immigrants is more significant in the short-run and less significant in the long-run. This is premised on the proposition in Åslund (2005) that the locational choices of immigrants may change as they spend more years in the destination country.

One of the major challenges in the examination of these propositions is that some migration policy changes are minor and not clear-cut which may create issues in econometric estimation. It is therefore important to identify major policy changes which have the potential for clear impact to be estimated. It is mainly for this reason that this study focuses on the two major migration policy changes- the 1972 Commonwealth immigration restrictions, and the liberalization of EU-A10 migration.

Based on the literature review and conceptual framework developed in this section, it is hypothesised that the immigration restrictions introduced in 1972 created a wave of Commonwealth immigrants of higher socio-economic class with a higher likelihood of residing in London. Conversely, the liberalisation of immigration for EU-A10 immigrants created a wave of EU-A10 immigrants with lower socio-economic status and thus a lower likelihood of concentrating in London. These hypotheses form the basis of the empirical analysis.

3.4 Data and Empirical Strategy

3.4.1 Data

Citizenship/nationality is a key factor in the analysis of migration policy impact (Borjas, 1987; Nickell and Salehen, 2017); thus, the need to use a dataset that identifies immigrants' countries of origin. Other factors such as socio-economic, demographic, individual characteristics, household characteristics, mobility and locational attributes are also important considerations in the analysis of the locational choices of immigrants (Åslund 2005). This study uses the United Kingdom Household Longitudinal Survey (UKHLS) dataset which contains the information that are required for the analysis. The survey follows a sample of 40,000 UK households in eight waves (as of November 2018), and it captures individuals and households' economic and non-economic attributes in longitudinal form, thus making it best suited for this study. The data contains information from immigrants (and non-immigrants) in the UK spanning from 2009 to 2017 (University of Essex, 2018) and the longitudinal sample is derived from an annual survey for all the households and individuals in the household throughout their life courses. This dataset is therefore the most suited UK-based dataset which meets the requirements for this study. The data collection is continuous with people interviewed every year making provision to capture both short and long-term changes. Furthermore, it has national, regional and local data for all four countries in the UK (Scotland, Wales, Northern Ireland and England), and it covers all ethnic and immigrant groups which allows for comparison of the experiences of people in different places. The stratified sampling increase representation of the sample of all the geographical regions, social classes and population densities, thus estimates are more precise than a simple random sample of the same size. This also indicates that the dataset is an adequate representation of the UK population, and this is essential for the nature of the study carried out.

The data and empirical strategy employed for both EU-A10 and Commonwealth migration waves are identical, although slight differences exist in the control groups. There are multiple categories of

immigrants that the policy changes did not affect based on their nationality and year of immigration. In the 2004 EU accession, there was a transition from non-EU to EU membership, hence the potential policy impact should only relate to the EU-A10 immigrants. Furthermore, the policy effects can only be linked to EU-A10 immigrants that migrated after 2004[28]. In the case of the Commonwealth group, the introduction of restrictions for Commonwealth citizens in 1972 only applied to Commonwealth immigrants that migrated after 1971, hence immigrants before January 1972 could not have been influenced by the restrictions.

The data has been transformed at different levels. First, the eight waves of individual and household level data were separately merged to create two panel datasets of eight waves each. The individual level data were further matched to the households which they belong to, effectively assigning the household level information to the individuals within the household. Because of the unbalanced nature of the panel[29] however, a pooled panel data set-up is used for the analysis. Pooling random samples drawn from the same population, but at different points in time increases the precision of estimators and tests statistics with more power (Wooldridge, 2014).

For the 2004 EU accession, the group of interest is the EU-A10 immigrant cohort[30], and the control group comprises of EU15 immigrants[31]. For the Commonwealth immigrants, the control group comprises of non-Commonwealth immigrants. Each of these two groups are further sub-divided into pre (three years before) and post (three years after) policy sub-groups in order to aid the identification of the migration policy effect. Tables 3.1a and 3.1b show the summary of the immigrants in the dataset based on the sub-sets created.

[28] Immigrants from EU-A10 countries before the 2004 accession migrated under restrictive conditions hence the policy change could not have impacted their migration decision.
[29] Some individuals do not take part in the interview in some years.
[30] Based on the argument that Malta and Cyprus are conspicuously richer countries than the other eight accession countries, it will be insightful to further delineate Malta and Cyprus from the other eight countries in the primary group for further analysis. However, the inadequacy of data in terms of sample size has made this delineation impossible.
[31] All immigrants from countries that were not members of the EU in 2004 are excluded. The is because non-EU immigrants operate under restrictive immigration policy systems and are thus subject to several migration policy changes which may be difficult to adequately account for.

Table 3.1a: Changes in the Percentage Distribution of Key Characteristics of the EU-A10 and EU15 Immigrants (3 years before and after the 2004 accession)

Variable	Variable name	EU-A10		EU15	
		Before (%)	After (%)	Before (%)	After (%)
Regional location in the United Kingdom	London	58.23	21.41	31.93	39.49
	SE England	12.66	17.75	15.97	11.46
	NE NW Yorkshire	6.33	18.28	16.81	13.38
	Midlands	8.86	14.88	12.61	10.19
	Others	13.92	27.68	22.69	25.48
Time until retirement age*	Time associated- relative to productive life	31.51	32.74	34.75	35.35
Educational Qualification (Original)	Degree	39.29	28.24	37.33	51.96
Household income*	Household income	0.11	0.02	0.12	0.11
Employment	Employed	75.95	76.50	57.14	57.32
Gender	Male	36.71	47.26	42.02	42.68
Lives with spouse	Yes	43.04	46.48	27.73	21.02
Number of children in household	No child	53.16	56.66	80.67	74.52
	One child	24.05	27.15	10.08	12.10
	Two or more children	22.78	16.19	9.24	13.38
Mobility	Expects to move soon	30.67	22.36	22.61	28.89
Tenure	Homeownership	26.15	15.64	21.79	13.39
	Private rental	60.00	61.56	48.72	62.50
	Public housing	13.85	22.80	29.49	24.11
Observations	Total number of observations	**79**	**383**	**119**	**157**

Notes: Total of **738** individuals: EU-A10 Pre-accession **79** (**129** person-year); EU-A10 Post-accession **383** (**1411** person-year); EU15 Pre-accession **119** (**384** person-year); EU15 Post-accession **157** (**463** person-year). **Mean reported*

Table 3.1b: Changes in the Percentage Distribution of key Characteristics of Commonwealth and non-Commonwealth Immigrants (3 years before and after the 1972 restriction)

Variable	Variable name	Commonwealth		Non-Commonwealth	
		Before (%)	After (%)	Before (%)	After (%)
Regional location in The United Kingdom	London	41.81	47.19	23.75	29.67
	SE England	10.03	10.11	16.25	13.19
	NE NW Yorkshire	14.05	11.99	12.50	13.19
	Midlands	20.74	16.10	8.75	6.59
	Others	13.38	14.61	38.75	37.36
Time until retirement age*	Time associated- relative to productive life	10.17	11.85	9.76	11.07
Educational Qualification (Original)	Degree	22.74	22.47	27.50	32.97
Household income*	Household income	-0.02	0.03	0.18	0.15
Employment	Employed	54.18	58.05	55.00	67.03
Gender	Male	44.15	47.94	43.75	42.86
Lives with spouse	Yes	66.89	74.53	51.25	53.85

Number of children in household	No child	70.90	66.67	80.00	80.22
	One child	13.71	13.48	11.25	7.69
	Two or more children	15.38	19.85	8.75	12.09
Mobility	Expects to move soon	8.03	8.61	11.25	10.99
Tenure	Homeownership	77.93	80.52	70.00	63.74
	Private rental	4.68	5.24	8.75	10.99
	Public housing	17.39	14.23	21.25	21.25
Observations	Total number of observations	**267**	**299**	**91**	**80**

Notes: Total of **737** individuals: Commonwealth Pre-1972: **267** (**1090** person-year); Commonwealth Post-1972: **299** (**1168** person-year); non- Commonwealth Pre-1972: **91** (**408** person-year); non- Commonwealth Post-1972: **80** (**356** person-year). **Mean reported*

The main empirical analysis focuses on a binary variable (outcome variable) of London vs. non-London, since there are relatively few observations when splitting the data by region. Ideally, UK locational and regional analysis are conducted at regional levels. However, the further regional analysis in this study sub-divides the data into five regional groups due to few observations with recorded regions: London, South East (South East region England), Northern England (North West, North East and Yorkshire), the Midlands (East and West Midlands) and other regions (East of England, South West, Wales, Scotland and Northern Ireland). Apart from the "others" category which is a category created for the regions with low frequency distribution, the four other regional categories have been created based on geographical contiguity and economic similarity.

One of the key issues in this study is a high correlation among some variables relating to age and time - biological age, number of years spent since migration, age at immigration and the year of the survey- all key factors that need to be controlled for when analysing immigrants' behaviour (see Rumbaut 2001, 2004). To avoid multicollinearity issues, a "relative approach" is adopted through the creation of a variable which captures the time-associated effects relative to the traditional age of retirement in the UK (65 years as) expressed below:

$$\textit{Time left until normal retirement age} = 65 - (\textit{age at immigration} + \textit{years spent in the UK})$$

$$= 65 - \textit{biological age}$$

This approach produces a variable that has a much lower correlation with *wave* (the interview year) thus enabling a measure of the effects of the lifecycle relative to the remaining years of economic productivity, while also explicitly accounting for time fixed effects.

The study also accounts for educational attainment, household income, employment status, gender, living with spouse, number of children, mobility and housing tenure as controls for socio-economic, demographic, household and mobility effects.

The variable definition, derivation and summary statistics are reported in Tables 3.2 and 3.3. All immigrants that belong to the interest and control groups that entered 3 years before or post the policy change are selected for the study, provided they contain all the variables that are required for the analysis. The study uses a 3 year-policy window to ensure that a reasonable number of observations are utilised, while also ensuring that the timeframe adopted (3 years before and 3 years after) does not capture other policy changes and associated factors. A total of 738 EU individuals have been observed over 8 waves with varying representation in different years which amounts to 1,726 observations for EU-A10 and EU15 countries[32]; and a total of 737 Commonwealth and non-Commonwealth immigrants have also been observed summing up to 3,022 individuals. The correlation matrices are reported in the Appendices 3.1 and 3.2. The narrowing down of the sample to immigrants within the policy window and individuals in the treatment and control groups is responsible for the small sample size. That notwithstanding, the sample used in this study is a true representation of the UK immigrants.

[32] This represents the number of observations that consistently contain information on all the variables in the models.

Table 3.2: Summary Statistics (EU-A10 and EU15)

			EU-A10			EU15		
Variable	**Variable name**	**Variable Description**	N*	Mean	SD	N*	Mean	SD
Regional location in the UK	London vs non-London	Binary variable: 1=if individual is resident in London; 0=if individual is not resident in London	1199	0.207	0.405	354	0.290	0.454
	London/South East/North England/Midlands/Others	Categorical variable: 1= if individual is resident in London; 2= if individual is resident in and South East England; 3= if individual is resident in North-west, North-east and Yorkshire; 4= if individual is resident in East and West Midlands; 5= if individual is resident in East England, South-west; Wales; Scotland; and Northern Ireland	1199	3.211	1.513	354	2.973	1.620
Treatment Indicators	EU-A10	Binary variable: 1=if EU-A10 and post-accession; 0=ifEU-A10 and pre-accession	1199	0.833	0.373	-	-	-
	EU 15	Binary variable: 1=if EU15 and post-accession; 0=if EU15 and pre-accession	-	-	-	354	0.527	0.500
	EU-A10 _ *EU 15*	Categorical variable: 1=A10 post-accession; 2=A10 pre-accession; 3=EU15 post-accession; 4= EU15 pre-accession	1199	1.167	0.373	354	3.472	0.500
Time left until normal retirement age	Time until retirement age	= 65-age at immigration-years spent in the UK = 65-biological age	1199	29.683	8.082	354	30.723	9.382
Educational Qualification	Degree	Binary variable: 1=if individual has degree; 0=otherwise	1199	0.351	0.478	354	0.444	0.497
Household income	Standardised OECD equivalised income	Household income variable is converted using equivalised household OECD scale, and further standardised	1199	0.052	0.555	354	0.232	0.783
Employment status	Employment	Binary variable: 1=if productively employed; 0= otherwise	1199	0.847	0.360	354	0.681	0.466
Gender	Male	Binary variable: 1=if individual is male; 0=if female	1199	0.458	0.498	354	0.395	0.489
Lives with spouse	Lives with spouse	Binary variable: 1=if living with spouse; 0=otherwise	1199	0.588	0.492	354	0.366	0.482
Number of children	Children	Categorical variable: 1=No child; 2=1 child; 3=2 or more children	1199	1.878	0.822	354	1.573	0.786
Mobility	Expecting to move	Binary variable: 1=if expecting to move; 0=otherwise	1199	0.190	0.393	354	0.237	0.425
Tenure	Homeownership/ rental/public housing	Categorical variable 1=if Homeownership; 2= if Rental; 3=if Public housing	1199	1.971	0.675	354	1.910	0.766

***** *N refers to the total number of person-year observations for each of the sub-sets.*

Source: *Authors' Computation, using University of Essex, 2018.*

Table 3.3: Summary Statistics (Commonwealth and non-Commonwealth)

			Commonwealth			Non-Commonwealth		
Variable	**Variable name**	**Variable Description**	N*	Mean	SD	N*	Mean	SD
Regional location in the UK	London vs non-London	Binary variable: 1=if individual is resident in London; 0=if individual is not resident in London	2258	0.425	0.494	764	0.261	0.440
	London/North/Midlands/ Others	Categorical variable: 1= if individual is resident in London; 2= if individual is resident in and South East England; 3= if individual is resident in North-west, North-east and Yorkshire; 4= if individual is resident in East and West Midlands; 5= if individual is resident in East England, South-west; Wales; Scotland; and Northern Ireland	2258	2.557	1.573	764	3.190	1.666
Treatment Indicators	*Commonwealth (CW)*	Binary variable: 1=if CW and post-accession; 0=if CW and pre-accession	2258	0.483	0.500	-	-	-
	Non-Commonwealth (nCW)	Binary variable: 1=if nCW and post-accession; 0=if nCW and pre-accession	-	-	-	764	0.534	0.500
	CW_ nCW	Categorical variable: 1=CW post-accession; 2=CW pre-accession; 3=nCW post-accession; 4= nCW pre-accession	2258	1.517	0.500	764	3.466	0.499
Time left until normal retirement age	Time until retirement age	= 65-age at immigration-years spent in the UK ≡ 65-biological age	2258	9.526	10.594	764	7.834	10.001
Educational Qualification	Degree	Binary variable: 1=if individual has degree; 0=otherwise	2258	0.260	0.438	764	0.321	0.467
Household income	Standardised OECD equivalised income	Household income variable is converted using equivalised household OECD scale, and further standardised	2258	0.094	0.805	764	0.200	0.818
Employment status	Employment	Binary variable: 1=if productively employed; 0= otherwise	2258	0.561	0.496	764	0.573	0.495
Gender	Male	Binary variable: 1=if individual is male; 0=if female	2258	0.462	0.499	764	0.445	0.497
Lives with spouse	Lives with spouse	Binary variable: 1=if living with spouse; 0=otherwise	2258	0.685	0.465	764	0.526	0.500
Number of children	Children	Categorical variable: 1=No child; 2=1 child; 3=2 or more children	2258	1.482	0.773	764	1.220	0.560
Mobility	Expecting to move	Binary variable: 1=if expecting to move; 0=otherwise	2258	0.066	0.249	764	0.075	0.263
Tenure	Homeownership/ rental/public housing	Categorical variable 1=if Homeownership; 2= if Rental; 3=if Public housing	2258	1.396	0.769	764	1.474	0.800

***** *N refers to the total number of observations in a pooled-cross sectional set-up for each of the sub-sets.*

Source: *Authors' Computation, using University of Essex, 2018.*

3.4.2 Empirical Framework and Methods

To recap, this research empirically analyses the locational choices and residential pattern of migrants under liberalised and more restrictive migrant policy systems. Two policy changes are analysed:

1) EU-A10 immigrants as the treatment group and the EU15 immigrants as the control group, with the policy change taking place in 2004.
2) Commonwealth immigrants as the treatment group and non-Commonwealth immigrants as the control group, with the policy change taking place in 1972.

The data does not contain information on the locational choices and other characteristics before and after the policy change which makes it impossible to observe where immigrants were living at the time of the policy change or where they first lived when they arrived the UK. Therefore, the study relies on the location of the immigrants at the time of the survey (4-7 years after the policy change for the EU10 accession and 36-39 years after the restrictions were introduced for Commonwealth immigrants). This effectively will enable the analysis of mid- and long-run locational pattern changes associated with the policy changes.

Two approaches are adopted:

1) A Regression Discontinuity Design (RDD) style estimation for those affected by the policy
2) A Difference-in-Difference (DiD) style approach using a control group of immigrants

3.4.2.1 Regression Discontinuity Design (RDD)

The RDD approach enables a comparison of immigrants who entered the UK just before and after the policy change date. However, the dataset only records the year of entry and not the month, hence, comparison can only be made with a yearly range around the change date. First, a probability model

is adopted to estimate the probability of an immigrant residing in London at time *t*, conditional on a set of observed characteristics x_{it} using a regression discontinuity style design

$$P(y_{it} = 1| x_{it}) = \beta_0 + \beta_1 POST_i^{TREAT} + \beta_2 x_{it} + \beta_3 T_i + u_{it} \quad (3.1)$$

Where *y* represents the dependent variable (resident in London); x_{it} includes a set of control variables; $POST_i^{TREAT}$ refers to the immigrant groups affected by the policy change- equals 1 if the group entered the UK after the policy change and 0 if they entered before; T_i are controls for time fixed effects; and u_{it} is the error term.. The same model is then estimated for the control group

$$P(y_{it} = 1| x_{it}) = \beta_0 + \beta_1 POST_i^{CONTROL} + \beta_2 x_{it} + \beta_3 T_i + u_{it} \quad (3.2)$$

The focus is on individuals arriving 3 years before and after the policy change (this analysis is further extended to both one- and two-yearly policy windows as a form of sensitivity analysis/robustness test and the results are briefly referenced).

Based on hypothesis 1, it is expected that the $POST_i^{TREAT}$ in equation 2 for the EU-A10 will be negative and statistically significant- suggesting that residing in London is less likely and residing outside London is more likely for the EU-A10 post-policy immigrants. It is also expected that $POST_i^{CONTROL}$ should be statistically insignificant because they were not affected by the policy change- suggesting that there are no changes in the locational pattern of EU15 immigrants, whether they immigrated before or after 2004.

For the Commonwealth immigrants, hypothesis 2 forms an expectation that $POST_i^{TREAT}$ will be positive and statistically significant suggesting that residing in London is more likely (and residing outside London less likely) for the Commonwealth post-1972 immigrants. It is also expected that $POST_i^{CONTROL}$ should be statistically insignificant because this policy change did not apply to them,

suggesting that there should be no significant difference in the locational choices of non-Commonwealth immigrants whether they migrated before or after 1972.

3.4.2.2 Difference-in-differences approach

As a further check, the RDD design is examined for its robustness in capturing the hypothesised effects by using a difference-in-differences (DiD) type approach. Given that it is impossible to observe the locational choices before and after the cut-off point and also before and after migration, a pure difference-in-differences may be difficult. Therefore, a difference-in-differences style estimation is adopted:

$$y_{it} = \beta_0 + \beta_1 POST_i + \beta_2 TREAT_i + \beta_3 POST_i * TREAT_i + \beta_4 x_{it} + \beta_5 T_{it} + u_{it} \quad (3.3)$$

This approach includes a control ($POST_i$) for whether the individual migrated pre or post policy change, a dummy variable for treatment ($TREAT_i$) for whether the individual is in the treated or control group, and an interaction between $POST_i$ and $TREAT_i$. The idea is that $POST_i$ controls for any differences before and after the policy change that may have impacted locational choices (affecting all individuals), $TREAT_i$ controls for any differences between the treated and control immigrants and the interaction term is the effect of being in the treatment group- after the policy change; with β_3 as the coefficient of interest. Given that there may have been other changes over time that could have impacted the location choices of the immigrants, the system of defining the treatment groups by 3 years on either side of the policy change is maintained. With a difference-in-differences approach the assumption is made that there are no spill-over effects, hence the policy is not expected to have had had an indirect impact on the control group.

Equations 3.1, 3.2 and 3.3 are estimated using a probit, given the choice is a binary one (London/non-London)

$$P(y=1|\, x) = E(y|\boldsymbol{x}) \tag{3.4}$$

The Probit model is estimated through maximum likelihood estimation (MLE). The MLE produces β estimates most likely to have resulted in the observed values of (y), given the explanatory variables (x), and where observations are assumed to be independent of each other. The likelihood function is the product of the individual probabilities for each outcome, with the log likelihood functions in the binary case:

$$\ln L(\boldsymbol{\beta} \mid \mathbf{x}_i) = \sum_{i=1}^{n} \left[(1 - y_i).\ln[1 - \Phi(\mathbf{x}_i'\boldsymbol{\beta})] + y_i.\ln \Phi(\mathbf{x}_i'\boldsymbol{\beta}) \right] \tag{3.5}$$

Unlike the OLS estimated coefficients, the probit estimated coefficients cannot be interpreted directly; hence the need to further estimate the average marginal effects (which are reported in the result tables). The average marginal effects measure the effect of a change in the explanatory variables on the probability of living in London and since the estimation is non-linear, all the other explanatory variables need to be held at specific values (typically their means, also known as partial/marginal effect at the average)

$$\frac{\partial p(\boldsymbol{\mu}_{\mathbf{x}})}{\partial x_j} = \hat{\beta}_j g(\bar{\mathbf{x}}\hat{\boldsymbol{\beta}}) \tag{3.6}$$

$\mu_x$represents the mean of the predictor variables (x); g represents the Probit link function.

In the probit model, there are no directly comparable r-squared measure as used in OLS but there are various pseudo r-squared measures. Considering that pseudo r-squared is not comparable to the OLS version, models with pseudo r-squared values between 0.2 and 0.4 are often considered good fit (Hensher and Johnson, 1981).

In order to mitigate against the error term being correlated within individuals (arising from the unbalanced nature of the panel), the standard errors are clustered at individual levels.

3.4.2.3 Other estimations

A second outcome variable (which breaks down the non-London regions into South East England, Northern England, Midlands and Others) is also examined. Given the concern about smaller cell sizes, a slightly different approach is utilised in the form of a categorical variable of four categories which groups the immigrants based on whether they are in the treatment or control group, and whether they are pre/post the policy, with the pre-policy immigrants in the control group as base category. The estimate is therefore

$$P(y_{it} = \mathrm{m}|x_{it}) = \beta_0 + \beta_1 POST_i^{CONTROL} + \beta_2 PRE_i^{TREAT} + \beta_3 POST_i^{TREAT} + \beta_4 x_{it} + \beta_5 T_i + u_{it} \quad (3.7)$$

Equation (3.7) is first tested in a binary probit model framework (where y_{it} in equation 3.7 measures London vs non-London locations i.e m=1,0); after which the multinomial framework is employed (where y_{it} in equation 3.7 refers to the regional categories defined above i.e. m=1,2,3,4,5).

This multinomial outcome variable has no natural ordering or sequence, hence the use of multinomial probit model (MNP). According to Duncan (2007), the general approach to modelling this outcome assumes that there are a series of latent propensities y^*_{im} for each discrete state (m representing the

values of the dependent variable y_i), each of which are assumed to depend on a series of exogenous characteristics. It is assumed that the probabilities linearly depend on common factors x_i thus:

$$y^*_{im} = x^{!}_i \beta_m + u_{im} \text{ for } m=1, 2, 3, 4, 5 \quad (3.8)$$

where β_m represents the vectors of parameters specific to each regional locational choice and u_{im} represents random disturbances with some potentially joint distribution. The assumption is that the observed outcomes are related to the underlying propensities through an observability criterion of the form

$$Pr(y_i = m|x_i) \quad (3.9)$$

However, some limitations on the number of parameters can be identified, suggesting that whatever the distribution of (u_{i1} , u_{i2} ..... u_{i5}), the probability $Pr(y_i = 1|x_i)$ is dependent on the differenced parameter vectors $(\beta_2 - \beta_1)$ ……$(\beta_5 - \beta_1)$

$$Pr(y_i = 1|x_i) = Pr(y^*_{i1} > y^*_{i2} \ldots\ldots y^*_{i1} > y^*_{i5}|x_i) \quad (3.10)$$

Thus, all the probabilities can be shown to depend only on the differences $(\beta_2 - \beta_1)$ ….. $(\beta_5 - \beta_1)$ which implies that the five vectors β_1, β_2 .... β_5 cannot be separately identified unless a normalisation is utilised traditionally, by setting β_1 to 0. This sets the first propensity y^*_{i1} as a benchmark against which all the other probabilities y^*_{im} for $m>1$ are scaled.

The MNP assumes the distribution of the set of the disturbances u_i, is multivariate normally and has the advantage of relaxing the Independence of Irrelevant Alternatives (IIA) assumption of the multinomial probit model which implies that for each locational choice, the propensity of residing in one region over the others is not affected by the presence or absence of other alternatives. It allows for

a general correlation structure between disturbances, though some restrictions are required on the covariance matrix for identification such as scaling the variance terms to unity, and some other restrictions are required on the covariance terms to avoid the "curse of dimensionality" which refers to the number of parameters expanding with the number of location options within the model.

It is difficult to interpret the coefficients of the MNP because the raw coefficients are not directly interpretable. However, it is possible to obtain probabilities of each choice by integrating the probability density function. Marginal effects (average marginal effects) on the probability of being in a category can give better insight to the overall effect of a change in the predictor variables on the different regional locational choices, and this can be calculated by evaluating the derivatives of each propensity relative to each regressor (this is conducted for each individual and the take an average across the individual marginal effects for each regressor).

The Commonwealth group is also explored further re-estimating equation 3.1 for the Commonwealth group and including a greater set of categories (further from the Commonwealth immigrants pre and post the policy change)

$$P(y_{it} = 1 | x_{it}) = \beta_0 + \beta_1 CWGROUP_i + \beta_2 x_{it} + \beta_3 T_i + u_{it} \quad (3.11)$$

$CWGROUP_i$ is a set of categories reflecting different groups of Commonwealth immigrants: belonging immigrants (Canada, Australia and New Zealand), while the non-belonging group was further broken down to Commonwealth immigrants from continental regions (Asian, Caribbean, African, and other Commonwealth countries). This analysis is based on the claim that the immigration restrictions may have been targeted at the non-Belonging Commonwealth citizens (as stated in section 3.2).

3.5 Results

This section shows the results obtained from the empirical analysis carried out. The first sub-section focuses on the impact of migration liberalisation (in the short-run); while the second focuses on the impact of migration restriction (in the long-run).

3.5.1 Impact of Migration Liberalisation (EU 2004 accession)

The first estimation is based on equations (3.1) and (3.2) within a simple binary modelling framework. The probit results are reported in Table 3.4, Panel A, with columns 1 and 2 reporting the treatment and control groups respectively. The dependent variable is London vs non-London, and both columns 1 and 2 (EU-A10 and EU15 groups respectively) are full-specification models with all controls and time-fixed effects. As a robustness check, the difference-in-difference type approach is adopted based on equation (3.3). As stated in section 3.4.2.3, it is difficult to estimate the average marginal effects of the interaction terms in a probit framework, hence; the raw coefficient for the probit is reported in column 1 of Panel B, Table 3.4. The OLS coefficients are further reported (column 2) as a proxy for the marginal effect of the DiD interaction term.

Table 3.4: Policy Effects on EU-A10 and EU15 Immigrants London vs Non-London

Panel A: Regression Discontinuity Design		
	EU-A10 (Probit)	**EU15** (Probit)
	(1)	(2)
VARIABLES	London vs non-London	London vs non-London
Pre-Policy	-	-
Post-Policy	-0.294***	-0.023
	(0.043)	(0.067)
Observations	1,199	527
pseudo r2	0.202	0.163
Panel B: Difference-in-Differences		
	(1)	(2)
VARIABLES	London vs non-London (Probit)	London vs non-London (OLS)
Post/Pre	-0.119	-0.0361
	(0.235)	(0.0722)

EU-A10/EU5	0.625**	0.225**
	(0.254)	(0.0872)
Interaction	-1.120***	-0.352***
	(0.313)	(0.102)
Observations	1,726	1,726
pseudo r2	0.164	0.181

Notes: ***Standard errors in Parentheses*** *(clustered at individual level);* *** p<0.01, ** p<0.05, * p<0.1; *Control variables include: age until retirement, educational attainment, household income, gender, living with spouse, number of children, mobility, tenure and time fixed effects.*

The results in Panel A, Table 3.4 show that the main research interest- the policy effect is statistically significant at 99% significance level for the EU-A10 group (a lower probability of residing in London by 29 percentage points). The results also reveal that this variable is statistically insignificant for the control group (EU15 group). The results from the control variables (not reported) are also generally as expected, though with some variation between the treatment and control groups. For instance, having a longer time until retirement and educational attainment have positive relationships with the EU-A10 immigrants residing in London (although educational attainment is statistically insignificant). These two factors however do not matter much for EU15 immigrants. Household income is also strongly related to the residential locational choices of both EU-A10 and EU15 groups, with a significantly stronger association observed for the EU15 group (about 27 percentage points) than the EU-A10 group (7 percentage points). Additionally, being in productive employment has a weaker relationship with residing in London, and this is statistically significant for EU-A10 immigrants but insignificant for EU15. The results further reveal that housing tenure is significantly related to the locational choices of EU-A10 immigrant, while gender, living with spouse, number of children and mobility are not statistically related to the location choices of EU-A10 immigrants.

The DiD interaction (in panel B of table 3.4) confirms that EU-A10 immigrants that migrated to the UK after 2004 are less likely to reside in London (about 35 percentage points) and this is also statistically significant.

Furthermore, the use of binary probit models with a categorical treatment variable is implemented based on equation (3.7) and the results are presented in column 1 in Table 3.5. The results show statistically significant differences in the probability of EU-A10 immigrants residing in London compared to EU-15 immigrants, suggesting that indeed, EU-A10 immigrants that migrated after 2004 are less likely to reside in London compared to pre-EU15 immigrants, while pre-EU-A10 immigrants are more likely to reside in London. Furthermore, the results show that the immigrants from EU-A10 countries that arrived in the UK before the liberalization (they migrated under a more restrictive framework) have a higher probability of residing in London.

Using the multinomial choice framework, further tests are carried out across the five regional groups for policy impact (based on equation 3.8) and the multinomial modelling specification results are reported in columns 2 to 6 in Table 3.5. Overall, the effects observed for London are similar to the probit model and it can be observed that the EU-A10 group is affected more by the policy change. It is particularly conspicuous that EU-A10 immigrants that migrated after the 2004 accession have a higher probability of residing in the Northern England regions and this is statistically significant. These effects may be attributed to the fact that some of the Northern city-regions (Manchester and Liverpool) are secondary immigrant concentrations in the UK and are also characterised by a lower cost of living, hence immigrants who chose to live outside London due to high cost of living find these cities as alternatives.

Table 3.5: Binary and Multinomial Probits with Categorical Regional and Treatment Variable

	Binary Probit	**Multinomial Probit**				
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	London vs non-London	London	South East	North	Midlands	Other
EU15 Pre	-	-	-	-	-	-
EU-A10 Post	-0.163***	-0.157***	-0.043	0.114***	0.034	0.051

	(0.061)	[0.061]	[0.057]	[0.043]	[0.058]	[0.070]
EU-A10 Pre	0.220**	0.225**	-0.098	0.018	-0.087	-0.058
	(0.088)	[0.088]	[0.062]	[0.063]	[0.059]	[0.086]
EU15 Post	-0.037	-0.033	-0.026	0.017	-0.023	0.065
	(0.073)	[0.073]	[0.070]	[0.046]	[0.067]	[0.082]
Observations	1,726	1,726	1,726	1,726	1,726	1,726
pseudo r2	0.164	-	-	-	-	-

Note: Standard errors in parentheses (clustered at the individual level); *** p<0.01, **; p<0.05, * p<0.1. *Includes same controls as in table 3.4.*

In addition to all the analysis carried out above, one-yearly and two-yearly policy window sensitivity analysis are also conducted, and the results are generally not substantially different[33].

3.5.2 Impact of Migration Restriction (Immigration Act 1971)

The first estimation is based on equations (3.1) and (3.2) and the probit results are reported in Table 3.6, Panel A. The difference-in-difference type approach also serves as a robustness test for the Commonwealth group based on equation (3.3) and the raw coefficients are reported in column 1 of Panel B, Table 3.6, while the OLS coefficients are also reported in column 2.

Table 3.6: Policy Effects on Commonwealth and non-Commonwealth Immigrants (London vs Non-London)

Panel A: Regression Discontinuity Design		
	Commonwealth (probit)	**Non- Commonwealth (probit)**
	(1)	(2)
VARIABLES	London vs non-London	London vs non-London
Pre-Policy	-	-
Post-Policy	0.090*	0.043
	(0.047)	(0.073)
Observations	2,258	764
pseudo r2	0.0597	0.108
Panel B: Difference-in-Differences		
	(1)	(2)

[33] The one-yearly and 2-yearly policy window results lose some statistical significance which may be due to small sample sizes. It should also be noted that some of the models in the 1-yearly window failed to converge due to the small cell sizes.

VARIABLES	London vs non-London (probit)	London vs non-London (OLS)
Post/Pre	0.086	0.0272
	(0.247)	(0.0765)
Commonwealth/non-Commonwealth	0.488**	0.166***
	(0.202)	(0.0637)
Interaction	0.167	0.0645
	(0.280)	(0.0906)
Observations	3,022	3,022
pseudo r2	0.0708	0.090

Note: Standard errors in parentheses (clustered at the individual level); *** p<0.01, **; p<0.05, * p<0.1. *Includes same controls as in table 3.4.*

The results reveal that the primary research interest- the policy effect is positive and statistically significant for Commonwealth immigrants, and statistically insignificant for non-Commonwealth immigrants. The results suggest that Commonwealth citizens that migrated to the UK after the introduction of the 1972 restrictions are more likely to reside in London (by 6 percentage points) compared to other UK regions (the long-run). The fact that the policy impact is statistically insignificant for non-Commonwealth immigrants may be an indication that the effects observed in the Commonwealth group are a result of the policy change.

The DiD interaction confirms that Commonwealth immigrants that migrated to the UK after 1971 are more likely to reside in London; although this is statistically insignificant. The statistically insignificant result may be due to varying effect across Commonwealth groups which justifies a further examination of the Commonwealth groups for the migration policy effects. Column 1 of Table 3.7 shows the results of the binary probit with a categorical variable treatment based on equation (3.7). As stated previously, the "others" category comprises of all the other regions with very low frequency, and while the result from this group does not offer significant insight, the inclusion of the observations from regions with low frequency ensures that the sample size is maintained. The results show that Commonwealth citizens that migrated to the UK after the implementation of the restriction are more likely to be concentrated in London compared to non-Commonwealth immigrants before the

restriction. The multinomial choice framework is further tested across the five key regional groups (equations 3.7 and 3.8) and the results are reported in columns 2 to 6 of Table 3.7. Overall, the effects observed in London are similar to those observed in the binary probit. However, the effects are generally statistically insignificant.

Table 3.7: Binary and Multinomial Probits with Categorical Regional and Treatment Variable

	Binary Probit	**Multinomial Probit**				
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	London vs non-London	London	South East	North	Midlands	Other
Non-CW Pre	-	-	-	-	-	-
CW Post	0.253***	0.256***	-0.073	-0.001	0.017	-0.199***
	(0.062)	[0.062]	[0.053]	[0.042]	[0.052]	[0.068]
CW Pre	0.160***	0.162***	-0.035	0.022	0.064	-0.213***
	(0.061)	[0.060]	[0.053]	[0.043]	[0.052]	[0.067]
Non-CW Post	0.025	0.029	-0.030	0.068	-0.055	-0.011
	(0.072)	[0.072]	[0.061]	[0.060]	[0.056]	[0.084]
Observations	3022	3,022	3,022	3,022	3,022	3,022
pseudo r2	0.0708	-	-	-	-	-

Note: Standard errors in parentheses (clustered at the individual level); *** p<0.01, **; p<0.05, * p<0.1. *Includes same controls as in table 3.4.*

Based on the classification of Commonwealth immigrants between 1962 and 1972 as belonging and non-belonging (as discussed in section 3.4.2.3), the Commonwealth immigrants are further re-categorised to reflect the different Commonwealth groups as shown in equation (3.11). The results (reported in Table 3.8) show that there is no statistically significant difference in the locational choices of belonging Commonwealth immigrants before and after the introduction of restrictions. The results also show that non-belonging Commonwealth immigrants (both pre and post 1972 restrictions) have significantly higher probability of residing in London, compared to belonging Commonwealth immigrants. This supports the claims that the restrictions had more significant impact on the non-belonging Commonwealth immigrants.

Table 3.8: Binary Probit across the Key Commonwealth Immigrant Groups

	Binary Probit
	(1)
VARIABLES	London vs non-London
Belonging Pre	-
Belonging Post	0.033
	(0.044)
Asian Post	0.525***
	(0.057)
Asian Pre	0.378***
	(0.048)
Caribbean Post	0.399***
	(0.154)
Caribbean Pre	0.464***
	(0.085)
African Post	0.441***
	(0.054)
African Pre	0.356***
	(0.065)
Other CW Post	0.219
	(0.142)
Other CW Pre	0.512***
	(0.152)
Observations	2,258
pseudo r2	0.104

Note: Standard errors in parentheses (clustered at the individual level); *** p<0.01, **; p<0.05, * p<0.1. *Includes same controls as in table 3.4.*

3.6 Robustness Test

A further robustness test is carried out on the RDD Probit models for the EU-A10 and Commonwealth immigrant groups. This entails the examination of the effects that the economic status of the regional groups may have on immigrants' locational choices by way of introducing regional attributes as control variables. Two key attributes are analysed: growth rate of regional house prices and growth rate of regional gross value added (GVA)[34]. The regional house prices control for the economic attributes of

[34] Data for the regional house prices was sourced from Nationwide UK regional series data (ND), and data for the GVA was sourced from the ONS (2018).

the housing market while the regional GVA controls for employment-related attributes[35]. Column 1 of Table 3.9 reports the result from the full model specification for the EU-A10 group, while column 2 reports the results for the Commonwealth group.

Table 3.9: Binary Probit Controlling for Regional House Prices

	(1)	(2)
VARIABLES	EU-A10 (Probit)	Commonwealth (Probit)
Pre-Policy	-	-
Post Policy	-0.097***	0.043**
	(0.020)	(0.018)
1 year lagged regional House Prices	0.061***	0.110***
	-0.006	(0.003)
1 year lagged regional GVA growth	-0.052***	-0.101***
	-0.007	(0.006)
Observations	527	1,069
Pseudo r2	0.7202	0.7418

Note: Standard errors in parentheses (clustered at the individual level); *** p<0.01, **; p<0.05, * p<0.1. *Includes same controls as in table 3.4*

Despite controlling for the effects of the regional attributes, the results in table 3.9 remain fairly similar to those observed in the previous models (although some variation can be observed in the magnitude of impact). The results further strengthen the proposition that a liberalised migration policy (column 1) may lead to a dispersion of immigrants from primary economic hubs and immigrant clusters (London); while a more restrictive policy (column 2) may increase the concentration of immigrants in the primary economic hubs and core immigrant clusters. It can also be observed that house price growth positively influences immigrants' preference for key economic hubs; while a GVA growth rate is a negative factor in both models, suggesting that as the GVA increases in UK regions, immigrants

[35] The regional attributes are both lagged by 1 year in order to examine the potential effects that the economic performance of the region in the previous year will have on the current locational choices of the immigrants.

tend to reside in regions outside of London. In all, the policy effect is consistent with the results observed from the previous models.

3.7 Summary and Conclusion

Immigrants' residential location choices have been attributed to the size and economic activities of cities, as well as the presence of immigrants' social networks (Åslund, 2005; Tanis, 2018). This study extends this further by examining the potential short-run and long-run impact of migration policy changes on the locational patterns of immigrants. Using data from surveys which observe individual and household characteristics collected from 2009 to 2017 and rigorous econometric techniques (Regression Discontinuity Design and Difference-in-Difference style approaches), the results show that changes to migration policy framework can significantly alter the short-run and long-run locational patterns of immigrants and by extension, regional and urban structures; although these effects may be stronger in the short-run both in quantitative terms and in terms of statistical significance.

The results also show inverse effects for liberalised and restrictive migration on locational choices of immigrants. Specifically, the results show that EU-A10 immigrants that arrived the UK after the 2004 migration liberalisation are less likely to be concentrated in London, despite the higher economic potential and a closely-knit social network which London offers. Conversely, Commonwealth immigrants that migrated to the UK after the implementation of the 1972 immigration restrictions are more likely to be clustered in London, even several decades after their migration. These patterns may be due to the much higher living cost in London (linked to unaffordable accommodation cost) which may discourage immigrants of lower socio-economic status from residing in London, but which may have minimal impact on immigrants of higher socio-economic status.

These results suggest that the migration policy framework through which immigrants were admitted into the country may significantly influence their decision to prioritise economic opportunities, social networks and cost of living when making their locational choices. In other words, immigrants under a liberalised migration policy system may have different order of priorities from immigrants that migrated under a more restrictive framework (in the choice of their residential location). The result further suggest that the cost of living may be a primary consideration for individuals that migrated within a liberalised migration policy framework, while this factor may be a less important consideration for immigrants within a restrictive migration policy framework.

Despite the limitations in this study, notably the small sample size, the hypotheses have been tested using various econometric techniques, thus arriving at robust conclusions. These results provide empirical evidence which support the proposition that a liberalised migration policy system may strengthen migration pull forces (Borjas, 1987), which may particularly attract immigrants of lower socio-economic status (Abrahamova, 2007; Ejermo and Zheng, 2018). The study also offers better insight on the potential link between migration policy changes, locational choices and the regional distribution of immigrants, further showing that migration policy changes may affect urban and regional structures. These insights are particularly important in understanding the potential impact of migration policy changes and immigration waves on housing demand, rents, house prices, mortgage markets and labour market dynamics in regional and metropolitan markets; as well as the impact on the public amenities and infrastructure. These insights can also be linked to immigrants' household consumption patterns, wealth, wellbeing, and welfare, with both social and economic implications.

This chapter has provided a basis for a more sub-national analysis of migration by developing theoretical and empirical links between migration policy, locational attributes and the locational

choices of immigrants. Having established the theoretical and empirical links between migration policy and the residential locational choices of immigrants, another important component of the residential outcomes of immigrants to consider is their housing tenure choices. The next chapter will therefore provide insight on the link between migration policy changes and the housing tenure patterns of immigrants.

CHAPTER FOUR

Do Liberalised Migration Policies Affect Housing Tenure Patterns? Evidence from the 2004 EU Expansion and UK immigration

4.0 Introduction

The previous chapter introduced the potential link between migration policies and urban and regional structures. The chapter specifically focused on the link between migration policy changes and the locational patterns of immigrants which is an important element of immigrants' housing decisions and outcomes. In order to broaden the insight on the link between migration policies and the housing market, chapter four focuses on another important element of immigrants' housing patterns- their housing tenure outcomes.

This study, using similar data and methods as chapter three, attempts to reinforce the conceptual and theoretical framework developed in chapter three by focusing on the potential link between the liberalised migration policy and immigrant's housing tenure patterns. The liberalised policy receives the spotlight in this chapter because it is the most contentious and controversial of the two main policy frameworks and has therefore attracted a diverse range of sentiments and debates. In addition to this, there are other data and empirically associated issues which may limit a robust analysis of the potential link between restrictive migration policy and housing tenure[36]. The major contribution in this study is the connection between migration policy effects (drawn from migration economics) the regional and

[36] As stated in chapter three, data inadequacies have made it difficult to empirically analyse the other migration policy changes associated with UK migration waves; and while the Commonwealth group was used to investigate the impact of restrictive migration policy in the UK, it is difficult to use the Commonwealth immigration cohort to empirically analyse the housing tenure patterns of this immigrant group because the policy was implemented approximately 40 years before the data was collected. This makes it difficult to implement a clear policy identification strategy for housing tenure over such a long period. Housing and microeconomics literature have established that individuals in the latter stages of their lifecycle may most likely have transited to homeownership; thus, commonwealth immigrants who have resided in the UK for over 40 years will most likely be advanced in their lifecycle and by implication most likely be homeowners after 40 years of residing in the UK. This makes it difficult to observe any significant variation.

locational choices of immigrants (drawn from chapter three) and the housing tenure patterns of immigrants. An amalgamation of these perspectives has hitherto been a literature "blind-spot".

In addressing the third research question of this thesis, this chapter relates the already developed conceptual framework in chapter three (specifically liberalised migration policy effects) to the housing tenure patterns of immigrants in the destination country and provides further empirical evidence to support this framework. The chapter aims to contribute to the literature by providing robust empirical evidence on the potential indirect effects of migration liberalisation and the mechanism through which these may change the housing pattern of the immigrant population.

In line with this, the following research objectives are explored:

i. To develop a conceptual link between migration policy and the housing tenure patterns of immigrants;
ii. To empirically analyse the direct and indirect consequences of migration liberalisation on the housing tenure patterns of immigrants;
iii. To examine the prospects of an increase in the demand for public housing resulting from the introduction of liberalised migration policies.

4.1 Background and Motivation of the Study

Migration policy is the underlying mechanism for the creation, alteration and sustenance of migration waves, and it directly or indirectly defines the socio-economic, socio-cultural and demographic composition of immigrants (Ejermo and Zheng, 2018). Despite enormous debates from scholars, policy makers, commentators and the citizenry, there is yet to be a consensus on if liberalised or

restrictive migration policy will best minimise the cost or maximise the benefit of migration. Migration liberalisation appears to be the most contentious of the two primary policy systems and it has attracted both positive and negative sentiments. Some scholars associate migration with positive outcomes such as enhanced economic growth (Drinkwater, Levine, Lotti and Pearlman, 2003) while others link migration with negative labour market effects (DeNew and Zimmeramann, 1994).

The United Kingdom has attracted immigrants from around the world in the last half century and several migration policy revisions have taken place (as highlighted in chapter three). The UK's accession to the European Union on 1st January 1973 is a significant landmark in this evolution. The implementation of the European treaty on free movement within the EU (the treaty was passed in 1989 and the free movement was implemented in 1993) is notable for changing the migration dynamics in Europe, and the UK in particular. This law became more noteworthy with the accession of 10 new countries to the EU in 2004 (EU-A10). The 2004 accession is the biggest expansion in the history of the EU and the most controversial, particularly because most of the new member states were from Central and Eastern Europe and generally perceived to be of lower economic status (Abrahamova, 2007). This chapter focuses on the EU-A10 immigrants to the UK between 2002 and 2005 using data available from 2009 to 2017. The empirical strategy and methodology employed are like those employed in chapter three, thus the treatment and control groups are maintained.

The relationship between migration policy and the labour market, capital movement, trade, innovation, transportation, information technology, social integration, economic growth and development have been the subject of extensive empirical research, and this frontier has been expanded further to urban and regional patterns and structures with the contribution made in chapter three. Even though chapter three makes a valuable contribution to the literature, providing further robust empirical evidence on

the potential indirect results of migration liberalisation and the mechanism through which these may change the housing pattern of the immigrant population will further boost the literature in this area. The link developed is based on previous research which show that legal status (Hall and Greenman, 2013), socio-economic characteristics (Painter, Gabriel and Myers, 2001; Kuebler and Rugh, 2013;), socio-cultural characteristics (Borjas, 2002; Nygaard, 2011; Zorlu, Mulder and Van Gaalen, 2014) and socio-demographic characteristics (Gyourko et al., 1999; Painter, Gabriel and Myers, 2001; Kuebler and Rugh, 2013) of immigrants influence their housing tenure outcomes.

This chapter contributes to migration and housing economics both theoretically and practically. First, migration shocks have rental, sales and mortgage market footprints; and second, housing tenure choices are linked to labour market dynamics, household mobility, consumption, investment, wealth and welfare; and these issues have social and economic implications which are vital in the current discourse on migration policy impact. This study is also valuable, considering the implications to many countries facing similar issues with migration policy.

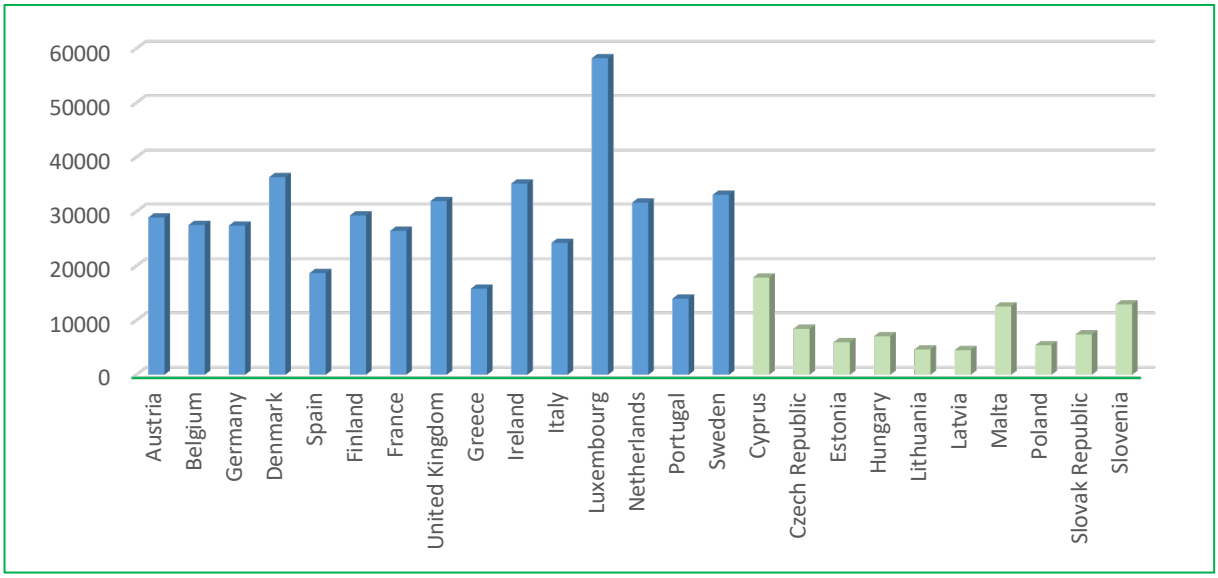
4.2. European Union Migration to the UK

The EU migration wave to the UK has been briefly highlighted in Chapter 3.2. This will however be elaborated further in this sub-section. The accession of the UK to the European Union on 1st January 1973 (European Commission, 2017) marked the beginning of its special relationship with the European Union. The relationship between these nations became more notable after the free movement within the EU was implemented in 1993, which marked the beginning of migration liberalisation within the EU. This became even more remarkable after the EU-A10 countries joined the EU in 2004. The spike

in immigration from the EU-A10 accession countries to the UK after 2004 is a clear contrast to the relatively stable immigration rates after the 1981, 1986 and 1995 accessions. Most of the immigrants to the UK before 2004 came from outside the EU, however, the EU-A10 accession countries now constitute a huge proportion of the immigrants to the UK (as shown in Figure 3.3).

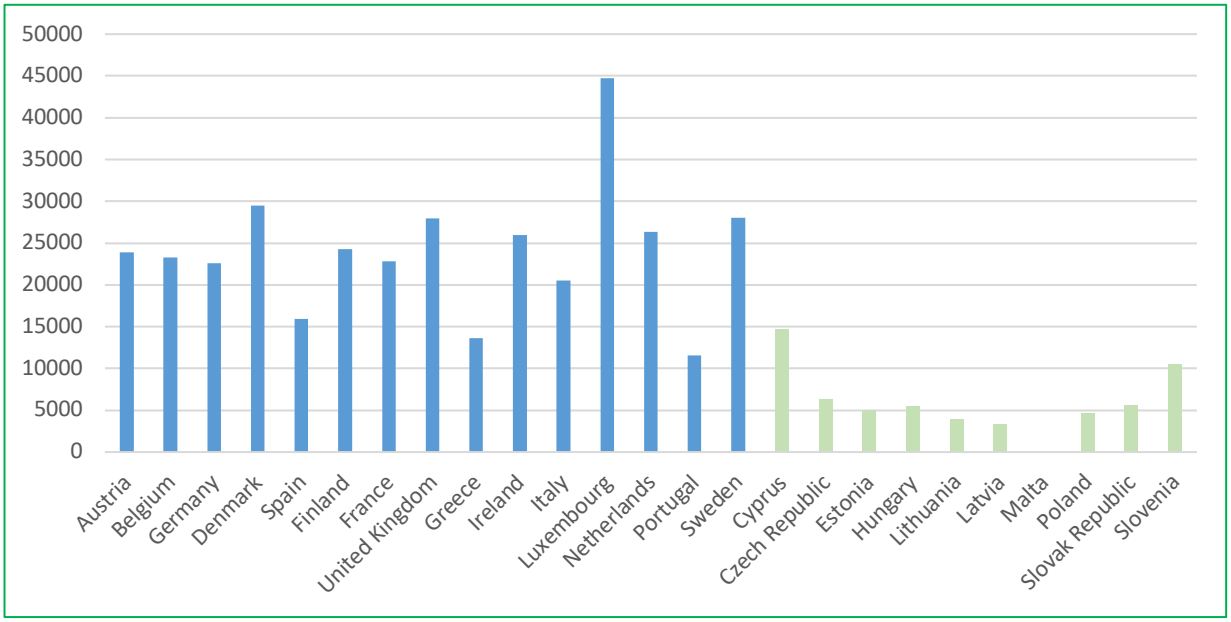
Figures 4.1 and 4.2 further show a higher GDP per-capita and average income levels for EU15 compared to EU-A10 countries.

Figure 4.1: GDP per-capita of EU15 and EU-A10 countries (2000-2005 aggregate)



Source: *Author's drawing based on data from World Bank, 2019*

Figure 4.2: Average Income of EU15 and EU-A10 countries (2000-2005 aggregate)



**Data for Malta is unavailable*

Source: *Author's drawing based on data from World Bank, 2019*

The economic disparity between the two groups of countries was therefore perceived as an inducement for EU-A10 immigrants to migrate to the EU15 countries in a quest for better economic opportunities after the liberalization. Before the accession, analysts estimated that 5 million to 40 million economic migrants would move from Central and Eastern Europe to other European countries, mainly because of the high differences in income and standard of living between E15 and A8 countries which created fears of a labour market over-supply and lack of social cohesion (see Drinkwater *et al.*, 2003).

Thus, following the 2004 accession, 12 of the EU15 countries (apart from the UK, Ireland and Sweden) maintained immigration restrictions for the A8 countries for a two-year period as a way of controlling the effect of the anticipated negative immigration selection arising from the economic pull/push disequilibrium.

The high level of migration flow from the A8 countries to the UK after the 2004 accession created a

series of debates which led to immigration restrictions for new accession countries to the EU afterwards. The debates further snow-balled into a full-blown national discourse which led to the 2016 Brexit referendum[37]. While the exact terms of Brexit are still being negotiated, it appears certain that the era of liberalised immigration from the EU to the UK may end soon. The liberalised policy has been in place for approximately three decades; however, the scope of liberalisation has been expanded by every new accession. It is thus challenging to adequately map out the liberalization policy effect on housing outcomes on a broad scale.

4.3. Conceptual Framework

The scant literature contribution relating to migration policy and its relationship to housing and urban economics makes it difficult to draw a direct conceptual link. The study is however premised on the idea that the relationship between migration policy changes and the housing outcomes of immigrants may be theoretically linked to the potential waves of immigrants that are associated with specific migration policy systems; and the dominant socio-economic, socio-cultural and demographic characteristics of immigrants in these immigration waves. This further suggests that changes to the housing patterns of immigrants following changes to migration policy may be the indirect result of the immigrants' selection mechanism which the policy change engineers. Because this study focuses on the impact of the liberalised migration framework, this framework will be elucidated further.

[37] The UK referendum on EU membership which led to majority of the UK voters voting to leave the EU.

4.3.1 Migration Liberalisation

Migration liberalisation is the more controversial of the two policy categories. The philosophy behind liberalised migration is the free movement of people, goods and services between countries. Advocates of liberalised migration postulate that liberalised migration aids population and demographic balance (Moses and Born Letnes, 2003), labour mobility (Borjas, 2001), trade growth (Markusen, 1983) and economic development (Drinkwater *et al.*, 2003);). Conversely, critics associate liberalized migration with weak border control, over-supply of labour (Borjas, 2001),), difficulty in social integration, lower education and skill level of immigrants (Ejermo and Zheng, 2018), and undue pressure on public amenities and services- particularly in cases where the liberalization is also accompanied by unrestricted access to housing, education and health care (Abrahámová, 2008; Ejermo and Zheng, 2018). It may however be argued that immigrants are typically self-selected and highly motivated (Borjas, 1987) thus, the probability of being less dependent on government welfare support. This however does not eliminate the possibility that some immigrants in a liberalised migration policy system may depend on public support.

Some scholars however refute some of the criticisms against liberalised migration. For instance, Huber and Bock-schappelwein (2014) find that the share of permanent migrants from the European Economic Area (EEA) to Austria with low education decreased when compared to the share of lower-educated permanent residents from other non-EEA countries after Austria became a member of the EEA in 1994. Beerli and Indergand (2014) also find that the abolition of quotas for workers from European countries through a bilateral agreement with the EU in 2002 had little negative impact on the level of education of immigrants to Switzerland.

Despite the seemingly divergent views on migration liberalization, scholars appear to implicitly or

explicitly suggest that the effects of liberalised migration depend on the nationalities that the policies apply. This implies that when migration liberalization applies to immigrants from countries with strong migration push forces, it may incentivize an exodus which may have negative consequences on the receiving country, particularly if the receiving country has strong migration pull forces (as observed in chapter one). Conversely, liberalized migration is perceived to leave positive footprints if the liberalization relates to countries with similar migration pull and push forces. Ejermo and Zheng (2018) corroborate this by stating that the objection to the free movement within the EU was almost non-existent until the period leading to the 2004 accession. Furthermore, the classification of the "poorer" EU-A10 countries as "A8" and the special status accorded to Cyprus and Malta and their exemption from the interim ban on immigration which was placed on the other A8 countries are further evidence that the migration push/pull disequilibrium is a vital consideration in liberalized migration policies.

4.3.2 The Relationship Between Migration Liberalisation and Housing Tenure

Prior research has focused largely on the link between migration and the housing market in general. However, developing a theoretical and empirical link between migration policy and the housing market remains unexploited. Housing tenure outcomes are typically linked to socio-economic factors (see Kuebler and Rugh, 2013). This is because housing tenure outcomes are theoretically associated with affordability, thus factors such as educational levels, skill level, labour market conditions, income, house prices and access to credit are key determinants of housing tenure outcomes of immigrants. Painter et al. (2001) suggest that individuals (particularly immigrants) with lower educational attainment may be less competitive in the labour market thus earning lower income than their counterparts, while Hall and Greenman (2013) further reveal that individuals (particularly immigrants) with lower education and skill-set may earn lower income and thus poses lower credit score, experience

down payment constraint and ultimately find it more difficult to secure mortgage facilities.

With migration policy playing the fundamental role of immigrants' selection, the policy framework therefore becomes an important determinant of the socio-economic and demographic composition of immigrants in a particular country; and with the fundamental role which socio-economic factors play in determining housing tenure outcomes, it can therefore be inferred that major changes to migration policy systems may have indirect consequences on the housing tenure patterns of the immigrant population. Specifically, the migration policy system that was operational when an individual migrated may be linked to the immigrant's propensity for homeownership, rental or public housing. Despite that there has been a general increase in private rental as well as a decline in homeownership and public-rented housing in UK in the last few decades (Barton, 2017), these changes are expected to be of more significant proportion in groups that were affected by the migration policy changes.

4.3.3 Hypothesis

Different hypothesis will thus be tested based on the conceptual framework developed:

Hypothesis 1: liberalised migration leads to a negative selection of immigrants of lower socio-economic status and this can decrease the homeownership probability of immigrants that migrated within the liberalised policy system and the general homeownership rate of the immigrant population;

Hypothesis 2: liberalised migration policy attracts individuals that are incentivized to immigrate because of better welfare systems, thus it is expected that immigrants that migrated in a liberalized migration policy system will have a significantly higher propensity for public housing.

The validation of the two hypotheses will further support the argument that liberalized migration potentially creates a wave of immigrants who may face more difficulties in becoming homeowners in

the short-term and mid-term; and immigrants that may likely increase public expenditure resulting from the increase in demand for public housing.

The evidence regarding the decline in homeownership and public-rented housing; and the concurrent increase in private rental (Barton (2017) does not invalidate the hypotheses. This is mainly because the decline and increase would have affected the general population, implying that the policy effect can still be isolated to the treatment group, with the control groups having different patterns. Furthermore, the decrease in homeownership and public rented housing, as well as the increase in private rented housing is expected to be more pronounced for the treatment group as a result of the policy change.

4.4. Data and Empirical Strategy

4.4.1 Data

The analysis in this study focuses on the three key housing tenure outcomes: homeownership, rental and public housing. To estimate the relationship between the EU-A10 accession and the probability of homeownership, rental and public housing for the EU-A10 immigrants to the UK, there is the need to use a dataset that identifies the immigrants' country of origin and year of immigration. In addition to these, other indicators of the socio-economic, demographic, household, mobility and locational factors are also vital for analysing housing tenure probability. The United Kingdom Household Longitudinal Survey (UKLS) dataset (used for the study in chapter three) is also employed for this study[38].

[38] The UKLS dataset currently has 8 waves of data with 16,263 immigrants (a variable indicates that they were born outside the UK) who respond at least once within the 8 waves and a total of 57,991 person-years observations. However, the study focuses is on a smaller subset of these immigrants, thus a total of 2,990 immigrants (10,677 person-years observations) are observed for those who are immigrants from either EU-A10 or EU15 countries. Because

There are multiple categories of immigrants that the EU-A10 accession did not affect based on their nationality and year of immigration. The 2004 accession was a transition of the EU-A10 countries from non-EU to EU membership, hence the potential policy effect should only be observed in the EU-A10 cohort. Specifically, the 2004 accession is not expected to have any effects on EU15 countries (because they were already operating under a liberalised migration system) and non-EU countries (because they remained in a restrictive policy framework even after the 2004 accession). Furthermore, individuals from the EU-A10 countries that immigrated before the 2004 accession migrated under an immigration restrictive framework, hence, it is also expected that the migration liberalisation did not influence their immigration decision. Thus, while EU-A10 accession is expected to have led to a change in the socio-economic composition of immigrants to the UK from the EU-A10 accession countries after 2004, and by extension, their housing patterns, it is expected that there will be no significant variation for pre-EU-A10 immigrants, EU15 immigrants (before and after 2004), and non-EU immigrants (before and after 2004).

The variables of interest in this study are transformed on different scales. To examine the impact of the EU-A10 migration liberalisation on housing tenure of the immigrants, the primary analysis focuses on immigrants from the EU-A10 countries, while the secondary analysis group comprises of immigrants from the EU 15 countries[39]. Two sub-sets of immigrants are therefore created: the *EU-A10* and *EU15* immigrants; and an indicator variable is created which shows if they immigrated in the two years preceding the liberalisation (2002 and 2003) or the two years immediately after the liberalisation

the primary interest group comprise of immigrants that migrated two years before and after the 2004 accession, EU-A10 and EU15 immigrant who immigrated to the UK between 2002 and 2005 (506 immigrants with 1,751 person-years observations) are further selected. The dataset is trimmed down further because of missing information on some variables. It is particularly worthy of note that some of the immigrants in the sub-sample of interest having missing information on their housing tenure which is the dependent variable, hence the sample size is further reduced to 427 immigrants (1398 person-years). Additionally, some other individuals also have missing information on some of the predictor variables, hence they are excluded from the sample, leaving 364 EU-A10 and EU15 immigrants (1,182 person-years) with complete information.

[39] The rationale for the choice of EU15 as a control group will be enunciated further in the empirical strategy section.

(2004 and 2005). This setup particularly supports the identification of the potential link between the migration policy framework and the immigrants' housing outcomes.

Individual housing tenure indicators have been created from the household tenure variable. Considering that the housing tenure outcomes are analysed against individual characteristics, and the root housing tenure variable is captured at household level, another variable is identified in the dataset which indicates the individual within the household that owns the home or is responsible for the rent. A new variable is therefore created, and this variable is conditioned on an individual indicating that he/she owns or rents the property, and a further check is made to ensure that the household housing tenure information is consistent with the individual's housing tenure status. All observations that do not satisfy these conditions are thereafter dropped from the dataset (such as individuals living with relatives).

A major challenge in the empirical analysis is the correlation of time and age-related variables, specifically, biological age, number of years spent since migration, age at immigration and the year the interview was conducted. While this challenge has been briefly discussed in chapter three, it is even more important to address this issue in relation to housing tenure outcomes because of the key roles that these factors play in housing tenure choices of immigrants. The year of the interview for instance is important because it controls for time fixed effects, while age at immigration is also an important factor to consider because it captures the variation in the acculturation prospects of immigrants (see Rubaurt 2001, 2004 for discussion on these). The biological age is also a standard factor in housing tenure analysis because it accounts for the lifecycle effects; while the number of years spent since migration is also a measure the immigrants' migration lifecycle which plays a significant role in the immigrants' housing outcomes (see Mariger, 1987; Megboluge and Linneman, 1993; Tin,

2000; Wakefield, 2009). Despite the importance of accounting for these variables in the analysis, their very high correlation with one another makes it impossible to account for them in a single model.

The "relative approach" adopted in chapter three is therefore also adopted in this study

$$\textit{Time left until normal retirement age} = 65 - (\textit{age at immigration} + \textit{years spent in the UK})$$

$$= 65 - \textit{biological age}$$

This approach produces a variable with a much lower correlation with *wave* which enables the measurement of the effects of the lifecycle relative to the remaining years of economic productivity, while also explicitly controlling time fixed effects.

The key link between the migration policy changes and the housing tenure patterns of immigrants after the policy change is mainly based on socio-economic factors, hence, various socio-economic factors are considered carefully in a bid to adequately capture the mechanism through which migration liberalisation results in changes in the housing tenure patterns of immigrants. Ideally, affordability factors which are linked to educational attainment, skill level, employment status, income, house price and credit access are important factors to consider (as discussed in Section 4.3). However, due to several individuals not reporting their house prices, credit and debt information, the factors which are available for the estimation are educational attainment and income, which in the context of the study, reasonably capture the basic socio-economic characteristics of the immigrants.

For educational attainment, the base category is defined as having a degree or higher qualification. This is set as the baseline because having a degree significantly boosts the labour market prospects (jobs opportunities and income) of an immigrant. This variable is therefore used as a control for the labour market prospects of immigrants. The measure of income is also carefully considered because

of the key role it also plays in determining housing tenure outcomes. Housing tenure decisions are typically more of a household's financial ability than individual's ability; hence the use of the household income variable rather than individual income. The household income is converted using the OECD equivalised household income scale[40] and the outcome of this is further standardised. This scaling methodology enables an adjustment of the household income in order to measure the standard of living in the household rather than just the total household income.

This study also accounts for gender, marital status (specifically living with spouse), number of children and mobility prospects as controls for demographic, household and mobility effects which are also key determinants of housing outcomes (Åslund, 2005; Hatton and Tani, 2005; Nygaard, 2011; and Skifter Andersen, Andersson, Wessel and Vilkama, 2016).

Controlling for location-fixed effects is also important in housing tenure analysis, and as is conventional in UK-based research, this is often done at regional levels. Due to few observations with recorded regional variables however, the UK regions are categorised in four main categories: London and South East England; North West England, North East England and Yorkshire; East and West Midlands; and others (East England, South West, Wales, Scotland and Northern Ireland). Apart from the "others" category which is a category created for the regions with low frequency distribution, the three other regional categories were created based on geographical proximity and economic similarity. Controlling for location fixed effects also indirectly controls for some unobserved heterogeneity

[40] Equivalisation is a standard methodology that adjusts household income to consolidate the different economic requirements of different households (such as household size and composition). Larger households typically require higher income than households with fewer individuals, and the household need and expenditure will increase with each additional member, but not proportionally as a result of economies of scale in the consumption. For instance, a single individual household with a monthly income of £2000 is better off financially than a household earning the same amount but with two or three individuals. Also, need for space, transportation and electricity may not increase at five times the rate as it will be for a household of five members, compared to a single individual household. Hence the household income in the data is adjusted to the OECD scale (first adult in the household is subject to a conversion fraction of 1; other additional adults are subject to a conversion fraction of 0.5; children below 14 years have a conversion fraction of 0.3) and this is further standardised to derive the standardised OECD equivalised income.

(particularly socio-economic factors) which relate to affordability at regional levels such as variations in regional labour market, house prices and mortgage market variations.

Table 4.1 shows the change in the percentage distribution of the characteristics of EU-A10 and EU15 immigrants that immigrated to the UK between 2002 and 2005. Because of the unbalanced nature of the panel dataset, individuals who remain in the dataset longer will have information for more waves and thus have a higher weighting. Ideally, it will be useful to compare the changes in the aggregate characteristics of the immigrants immediately before and after they migrated to the UK; however, the dataset does not contain this information[41], hence the data from their first year of observation (which would be at different points because not every individual entered the survey at the same time) is utilised.

Table 4.1: Change in the Percentage Distribution of key Characteristics of the two Immigrant Groups (2 years before and after 2004)

Variable	***Variable name***	***EU-A10***		***EU15***	
		Before (%)	**After (%)**	**Before (%)**	**After (%)**
Tenure	Homeownership	26.00	17.79	19.61	15.19
	Private rental	60.00	61.54	54.90	56.96
	Public housing	14.00	20.67	25.45	27.85
Time until retirement age#	Time associated- relative to Time until retirement age	31.66	32.54	33.70	35.63
Educational Qualification (Original)	Degree	39.02	29.38	39.58	51.39
Household income#	Household income	0.08	0.03	0.10	0.08
Employment	Employed	75.00	79.00	61.25	57.27
Gender	Male	35.00	46.48	43.75	39.09
Lives with spouse	Yes	41.67	50.78	30.00	21.82
Number of children in household	No child	53.33	54.69	81.25	72.73
	One child	20.00	29.69	6.25	14.55
	Two or more children	26.67	15.63	12.50	12.73
Mobility	Expects to move soon	25.86	21.00	26.03	22.34
Regional location in The United Kingdom	London & SE England	68.33	40.63	45.00	52.73
	NE NW Yorkshire	6.67	17.19	21.25	12.73
	Midlands	10.00	13.67	6.25	10.00
	Others	15.00	28.52	27.50	24.55

[41] The only information which is available for the immigrants immediately before and after migration are information that are fixed over time such as age at migration, year of birth and country of birth (among others).

Observations	Total number of Individuals	**60**	**256**	**80**	**110**

Notes: Total of 506 individuals: EU-A10 Pre-accession 60 (129 person-year); EU-A10 Post-accession 256 (699 person-year); EU15 Pre-accession 80 (150 person-year); EU15 Post-accession 110 (204 person-year).

The descriptive evidence in Table 4.1 also shows a decline in the proportion of homeownership and an increase in public housing levels for EU-A10 immigrants that arrived after the migration liberalisation. Differences can also be observed in gender composition and immigrants residing with their spouses' data between the two groups. Furthermore, it can be observed that the immigrants from the EU-A10 countries that migrated after 2004 have lower education levels and significantly lower income which corroborate the proposition in this study that the migration liberalisation created a selection of immigrants of lower socio-economic status which may have engineered the changes in the housing tenure patterns of this immigrant group. There is however very minimal observed variation in the time until retirement, employment status, number of children in the household and mobility (before and after the policy) for the EU-A10 immigrants. The obvious preference of EU-A10 immigrants that arrived post-2004 to reside outside of London and South East England is also observed and this has been extensively analysed in chapter three.

While there are similarities in some attributes between the observations in pre and post in EU-A10 group and the observations in EU15 groups, there are also notable differences. The EU15 group has higher homeownership, higher educational attainment, much higher income levels but lower incidence of living with spouse and rather surprisingly, slightly lower incidence of productive employment. Both groups have quite similar locational preferences i.e. being in London and South East England. It should also be noted that the EU15 group record slight decreases in their homeownership rate pre/post policy. This is however merely descriptive, and does not indicate relationship or causality, hence the empirical framework is structured to test the proposition for the statistical significance in the changes observed after controlling for socio-economic factors and other effects.

Table 4.2 provides the definition and derivation of the variables in the models along with basic summary statistics. The summary statistics are reported for EU-A10 and EU15 countries that have complete information and are included in the estimations, thus a total of 364 individuals have been observed over 8 waves with varying representation in different years which amounts to 1,182 observations[42]. Despite the limitation of relatively few observations, this dataset is the only available dataset that captures the migration information required as well as other key individual and household characteristics required to test this hypothesis.

The correlation matrix is reported in Appendix 4.1. While a few correlations among predictor variables are more than 30%, none are at alarming high level to cause significant multicollinearity issues.

[42] This represents the number of observations that consistently contain information on all variables.

Table 4.2: Summary Statistics

			EU-A10			EU15		
Variable	**Variable name**	**Variable Description**	N*	Mean	SD	N*	Mean	SD
Tenure	Homeownership/ rental/public housing	Categorical variable 1=if Homeownership; 2= if Rental; 3=if Public housing	828	1.947	0.674	354	1.876	0.742
	Ownership	Binary variable: 1=if Homeowner; 0=if non-homeowner	828	0.255	0.436	354	0.345	0.476
Treatment Indicators	EU-A10	Binary variable: 1=ifEU-A10 and post-accession; 0=ifEU-A10 and pre-accession	828	0.844	0.362	-	-	-
	EU 15	Binary variable: 1=if EU15 and post-accession; 0=if EU15 and pre-accession	-	-	-	354	0.576	0.495
	EU-A10 _ *EU 15*	Categorical variable: 1=A10 post-accession; 2=A10 pre-accession; 3=EU15 post-accession; 4= EU15 pre-accession	828	1.156	0.362	354	3.423	0.495
Time left until normal retirement age	Time until retirement age	= 65-age at immigration-years spent in the UK = 65-biological age	828	29.843	7.813	354	29.895	8.805
Educational Qualification	Degree	Binary variable: 1=if individual has degree; 0=otherwise	828	0.353	0.478	354	0.446	0.498
Household income	Standardised OECD equivalised income	Household income variable is converted using equivalised household OECD scale, and further standardised	828	0.056	0.591	354	0.270	0.801
Employment status	Employment	Binary variable: 1=if productively employed; 0= otherwise	828	0.845	0.362	354	0.706	0.456
Gender	Male	Binary variable: 1=if individual is male; 0=if female	828	0.455	0.498	354	0.429	0.496
Lives with spouse	Lives with spouse	Binary variable: 1=if living with spouse; 0=otherwise	828	0.600	0.490	354	0.398	0.490
Number of children	Children	Categorical variable: 1=No child; 2=1 child; 3=2 or more children	828	1.861	0.813	354	1.641	0.834
Mobility	Expecting to move	Binary variable: 1=if expecting to move; 0=otherwise	828	0.199	0.400	354	0.218	0.413
Regional location in the UK	London and SE	Categorical variable: 1= if individual is resident in London and South East; 2= if individual is resident in North-west, North-east and Yorkshire; 3= if individual is resident in the East and West Midlands; 4= if individual is resident in East England, South-west; Wales; Scotland; and Northern Ireland	828	2.473	1.248	354	2.322	1.329

***** *N refers to the total number of person-year observations for each of the sub-sets.*

Source: *Authors' Computation, using University of Essex, 2018*

4.4.2 Empirical Framework and Methods

Probability models are used for the first analysis which estimate the conditional probability of homeownership (conditional on a set of vector of unobserved characteristics "*x*" on Homeownership "y"=1. $P(y=1|x)$, based on the assumption that the zero conditional mean assumption holds (similar to the approach in chapter three):

$$P(y=1|x) = E(y|x) \tag{4.1}$$

The first outcome variable (Own and non-own) is in binary form, hence the suitability of a probit model. The models are defined in terms of latent variable thus:

$$y_i^* = \mathbf{x}_i'\boldsymbol{\beta} + e_i \tag{4.2}$$

y_i* enables an observation of an individual's housing tenure status, particularly if an immigrant owns (1) or does not own (0) and the values are determined by whether the outcome variable (y_i*) crosses a threshold or not. This suggests that a slight change in some of the observed attributes (x) may change the latent variable to induce an immigrant's transition to homeownership while other immigrants maintain their status. e_i captures the errors which are assumed to be independent of x_i and symmetrically distributed around "0". The marginal effect

is reported because it shows the estimated impact of the explanatory variables (policy variable inclusive) on the likelihood of homeownership, thus aiding the analysis of the link between the introduction of immigration liberalisation and immigrants' housing patterns.

The second outcome variable contains discrete multiple alternatives (ownership, private rental, and public housing) with no natural ordering or sequence, hence the use of a multinomial probit model (this is also identical to the approach in chapter three) taking the form

$$Pr(y_i = 1|x_i) = Pr(y^*_{i1} > y^*_{i2} \text{ and } y^*_{i1} > y^*_{i3}|x_i) \quad (4.3)$$

The two remaining probabilities will be

$$Pr(y_i = 2|x_i) = Pr(y^*_{i2} > y^*_{i1} \text{ and } y^*_{i3} > y^*_{i1}|x_i) \quad (4.4)$$

$$Pr(y_i = 3|x_i) = Pr(y^*_{i3} > y^*_{i1} \text{ and } y^*_{i3} > y^*_{i2}|x_i) \quad (4.5)$$

Thus, all the probabilities can be shown to depend only on the differences ($\beta_2 - \beta_1$) and ($\beta_3 - \beta_1$) which implies that the three vectors β_1, β_2 *and* β_3 cannot be separately identified unless a normalisation is utilised traditionally, by setting β_1 to 0. This sets the first propensity y^*_{i1} as a benchmark against which all the other probabilities y^*_{im} for $m>1$ are scaled.

A quasi-experimental setting is adopted to empirically analyse the housing tenure patterns of the EU-A10 immigrants before and after the accession. The non-EU immigrant group would be the ideal control group. However, setting the non-EU immigrants as the control is problematic because non-EU immigrants in the UK operate under a restrictive migration policy system; and because restrictive migration policies are typically reviewed periodically, there is the possibility that the models for the non-EU group may pick up variations between the pre

and post 2004 immigrants, thus capturing other policy changes for the non-EU group which may be unrelated to the 2004 EU accession. This may make it difficult to isolate the 2004 EU accession impact.

The EU15 immigrant group is therefore set as the control group in the analysis. While the EU15 group may not be ideal (because the EU-A10 immigrants that migrated after 2004 effectively become similar to the EU15 immigrants after the 2004 accession), it is expected that the pre/post EU15 immigrant groups should have minimal variations in their characteristics (pre and post 2004) because EU15 countries were already members of the EU before 2004. It is therefore expected that the pre/post EU15 immigrant groups should have no statistically significant differences in their housing tenure patterns. This effectively becomes a pseudo "falsification test". With this setting, if the EU-A10 pre/post 2004 model captures parallel trends other than the policy impact, similar effects should also be observed in the EU15 group; conversely, if statistically significant differences are observed between the EU-A10 pre/post policy groups and similar differences are not observed between the pre/post EU15 groups, the hypothesis that the policy change is most likely responsible for the variations observed in the changes in the housing pattern of the pre/post EU10 groups after controlling for other key characteristics can therefore be validated.

The difference-in-differences (DiD) approach is ideal for this analysis, however, there are some empirical issues which are associated with defining the control group and these must be addressed. While the setting described above appears to serve the purpose of providing a non-intervention group, it creates other empirical issues which particularly make a clear difference-in-differences approach difficult to implement. Additionally, the ideal difference-in-

differences is also difficult to implement with this setting because the dataset which is in use makes it impossible to observe the housing tenure outcomes and other characteristics of the immigrants before and after the policy change- only these characteristics from 2009 onwards can be observed (which creates a lag of about 4-7 years before the data were collected). Alternative approaches are therefore adopted

(i) A regression discontinuity design (RDD) style estimation for EU-A10 immigrants

(ii) A difference-in-difference (D-in-D) style approach using EU 15 immigrants as a control group, serving as a form a validation.

4.4.3 Regression Discontinuity Design (RDD)

The RDD approach enables a comparison of immigrants who entered the UK just before and after the 2004 policy change date. However, the dataset only records the year of entry and not the month, hence, comparison can only be done with a yearly range around the cut-off point. The setting effectively makes it difficult to implement a clear regression discontinuity design (RDD) approach where clear criteria determine whether immigration occurred before or after 2004 (see Lee and Lemieux, 2010 for a review of the RDD). A key fundamental of the RDD approach is that individuals would be similar around the cut-off point. It is further expected that the smaller the range form the cut-off point, the more similar the immigrants are expected to be. Based on the literature and conceptual framework however, the hypothesis is that the socio-economic characteristics of individuals may be different, though other factors may be similar.

Usually a RDD would include a measure of how far from the cut-off point the individual is but this is not possible given that the year of immigration to UK is the main information that is available hence have very little variability[43]. The following equations are estimated

$$y = \beta_0 + \beta_1 POST^{EUA10} + \beta_2 x + \beta_3 T + u \quad (4.6)$$

$$y = \beta_0 + \beta_1 POST^{EU15} + \beta_2 x + \beta_3 T + u \quad (4.7)$$

Where *y* represents the dependent variable (housing tenure); in eqn. 4.6, $POST^{EUA10}$ is equal to 1 if the EU-A10 immigrant entered after 2004 (2004-05) and 0 before (2002-03); *x* includes a set of control variables; *T* are controls for time fixed effects; and *u* is the error term. It is expected that $POST^{EUA10}$ should be statistically significant- suggesting that homeownership is less likely and other non-ownership options (rental and public housing) more likely for the EU-A10 post-policy immigrants. It is also expected that $POST^{EU15}$ in eqn. 4.7 should be statistically insignificant because they were not affected by the policy change- suggesting that there are no significant differences in the housing tenure pattern of EU15 immigrants, whether they immigrated before or after 2004.

4.4.4 Difference-in-differences Approach

As a robustness test, a difference-in-differences style estimation is adopted

$$y = \beta_0 + \beta_1 POST + \beta_2 EUA10 + \beta_3 POST * EUA10 + \beta_4 x + \beta_5 T + u \quad (4.8)$$

This approach includes a control for whether the individual is in pre or post-2004 (*POST*), a dummy variable for whether the individual is a citizen of an EU-A10 or EU15 (*EUA10*)

[43] Having data on the month of migration may be more helpful but this is not available.

country, and an interaction between post-2004 and EU-A10 (*POST* EUA10*). The idea is that *POST* controls for any differences pre and post 2004 that may have impacted housing tenure (that affects all individuals), *EUA10* controls for any differences between EU-A10 and EU15 immigrants and the interaction term is the effect of being in the EU-A10 post 2004. It is the *POST*EU-A10* which is the coefficient of interest.

Assumptions:

- The parallel trends assumption assumes the trends of the two groups is the same over time this can be tested using a placebo/falsification test;
- There must be no spill over effects, so the policy should not have had an indirect impact on the EU15 group.

Given it is difficult to obtain average marginal effects for eqn. 4.8, an alternative categorical approach is also adopted where the EU15 immigrants who migrated before 2004 serve as a control group and compare the other three groups, post-2004 EU-A10, pre-2004 EU-A10 and post-2004 EU15:

$$y = \beta_0 + \beta_1 POST^{EUA10} + \beta_2 PRE^{EUA10} + \beta_3 POST^{EU15} + \beta_4 x + \beta_5 T + u \qquad (4.9)$$

In addition to these, a form of placebo test is implemented as a further robustness tests for the results[44].

[44] The timing of homeownership transition has also been considered as an alternative analysis measure which has important implications as homeownership itself. This approach will require the implementation of survivor analysis with competing risk (see McCall, 1996) as an alternative methodology. However, due to the constrain associated with the nature of the data which was collected from 2009, it is impossible to observe homeownership transition before 2009 when the survey started. Implementing this strategy will therefore lead to loss of observations which will further result in smaller sample sizes.

4.5 Results and Discussion

Across all tables, the marginal effects are reported and since there are repeated observations for individuals, although in an unbalanced manner, the standard errors are clustered at the individual level. First, equations (4.6) and (4.7) are estimated within a simple binary modelling framework. The probit results are reported in Table 4.3. Columns 1-3 report the results for the EU-A10 group and columns 4-5 report for the EU15 group. In column (1), the full model specification is reported with all socio-demographic factors without controlling for the location fixed effects. The dependent variable is own vs non-own (the own category refers to homeownership; while the non-own category comprises of private rent and social rent). Column (2) reports the same specification as in column (1) but with an inclusion of location fixed effects. The location fixed effects are maintained in the rest if the models and reported in the tables. The choice between homeownership and private renting is also tested and the results for both groups do not differ whether only private rent or non-ownership is adopted as the base category for the outcome variable (columns 2 and 3).

Table 4.3: Binary Probits comparing EU-A10 and EU15 (Own vs non-own; Own vs Private Renting)

	EU-A10 Immigrants			EU15 Immigrants	
	(1)	(2)	(3)	(4)	(5)
VARIABLES	Own vs non-own	Own vs non-own	Own vs Private rent	Own vs non-own	Own vs private rent
Pre-Policy	-	-	-	-	-
Post-Policy	-0.149**	-0.189***	-0.183***	-0.091	-0.097
	(0.067)	(0.059)	(0.061)	(0.069)	(0.086)
Time until retirement age	<-0.001	<-0.001	0.003	0.002	0.006
	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)
Degree	0.189***	0.191***	0.180***	0.073	0.082
	(0.054)	(0.048)	(0.051)	(0.057)	(0.072)
Household income	0.146***	0.153***	0.130***	0.248***	0.238***
	(0.039)	(0.035)	(0.036)	(0.052)	(0.061)
Employed	-0.110*	-0.116**	-0.095*	0.045	-0.077
	(0.063)	(0.053)	(0.053)	(0.061)	(0.083)
Male	0.051	0.041	0.008	-0.119*	-0.086

	(0.056)	(0.051)	(0.056)	(0.070)	(0.090)
Lives with spouse	0.170***	0.158***	0.195***	0.227***	0.255***
	(0.058)	(0.052)	(0.056)	(0.058)	(0.073)
No child	-	-	-	-	-
One child	0.121**	0.118***	0.076	0.057	0.028
	(0.049)	(0.044)	(0.050)	(0.064)	(0.082)
Two children and more	0.139**	0.159**	0.156**	-0.014	-0.081
	(0.066)	(0.062)	(0.070)	(0.071)	(0.086)
Mobility	-0.187***	-0.168***	-0.214***	-0.411***	-0.490***
	(0.052)	(0.049)	(0.052)	(0.110)	(0.112)
London and SE	NO	-	-	-	-
NE, NW and York	NO	0.314***	0.455***	0.149**	0.255***
		(0.068)	(0.075)	(0.071)	(0.093)
Midlands	NO	0.084	0.168*	-0.121	-0.169
		(0.073)	(0.097)	(0.110)	(0.142)
Others	NO	0.105*	0.166**	0.139*	0.114
		(0.060)	(0.066)	(0.075)	(0.093)
Wave 1	-	-	-	-	-
Wave 2					
	(0.027)	(0.028)	(0.031)	(0.046)	(0.048)
Wave 3	-0.051*	-0.065**	-0.058*	0.112**	0.149**
	(0.030)	(0.031)	(0.035)	(0.049)	(0.059)
Wave 4	0.001	-0.010	0.019	0.103**	0.181***
	(0.038)	(0.040)	(0.046)	(0.041)	(0.057)
Wave 5	0.004	-0.016	0.010	0.124***	0.208***
	(0.040)	(0.041)	(0.048)	(0.045)	(0.061)
Wave 6	0.017	0.019	0.085	0.076	0.145**
	(0.044)	(0.046)	(0.059)	(0.052)	(0.071)
Wave 7	0.063	0.051	0.127**	0.101*	0.191***
	(0.048)	(0.051)	(0.063)	(0.054)	(0.073)
Wave 8	0.174***	0.174***	0.268***	0.082*	0.180***
	(0.055)	(0.056)	(0.068)	(0.045)	(0.066)
Specification	(No location FE)	(Location FE)	(Location FE)	(Location FE)	(Location FE)
Observations	828	828	661	354	276
pseudo r2	0.259	0.333	0.382	0.506	0.468

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level.*

In terms of the key results, it can be observed that the main focus variable- the policy indicator, is negative and statistically significant for the EU-A10 group, suggesting that the EU-A10 immigrants that migrated after 2004 have a lower probability of homeownership by 14-18 percentage points, but this is statistically insignificant for the EU15 group. It can be recalled from the descriptive evidence in Table 4.1 that indeed both EU-A10 and EU15 groups

experienced a decline in homeownership after 2004. However, what is observed from the results is empirical evidence that this decrease in homeownership is statistically significant for the EU-A10 immigrant group and statistically insignificant for the EU15 group.

The proposition ab-initio is that the liberalisation of migration causes a socio-economic dis-balance in the immigrant stock which serves as the underlying mechanism for the changes in the housing tenure patterns of the immigrant population after the policy change. There is therefore the need to focus on some of these moderating factors, particularly as the descriptive statistics show that that the EU-A10 immigrants after 2004 have a composition of fewer individuals with degrees and lower household income. The results show that educational attainment (having at least a first degree) contributes significantly and favourably towards the EU-A10 immigrants' homeownership; however, it does not appear to matter that much for the immigrants from EU15 group. Furthermore, household income is a clear and strong explanatory variable (having positive effects on homeownership prospects) for both groups, with a much stronger effect for the EU15 group (almost 24-25 percentage points) than the EU-A10 group (about 13-15 percentage points). With these two variables being the key socio-economic indicators (accounting for housing affordability), it can be concluded that the lower socio-economic status of EU-A10 immigrants' post-policy may be a major explanatory factor in their lower homeownership prospects. It is expected that these factors will most likely lead to credit constraints (possibly arising from lower credit score) and down payment constraint which will further have adverse effects on homeownership prospects for this immigrant cohort.

When controls are introduced to account for other factors which may influence housing tenure patterns, it is observed that living with spouse is also another favourable contributor towards

homeownership for both groups. This may be related to the fact that living with a partner increases the household income which may improve the financial conditions in the household. Having a child also increases the likelihood of homeownership but having more than one child increases the chances even more. However, this is only true for the EU-A10 group. It can also be observed that mobility (as defined by whether the household is expecting or planning to change accommodation) has a significant negative impact on homeownership choices and it is much stronger for the EU15 group than the EU-A10 group. This could be due to a possibility that EU15 group, being of higher socio-economic status (from richer countries and possessing higher educational attainment, skillset and with higher household income), intention to move may be infrequent but a very significant factor when they decide to move, leading to much higher adverse effect towards homeownership decision. Additionally, the results show, rather unsurprisingly, that all other regions tend to support homeownership due to better affordability (compared to London and South East England).

The results also show that time until retirement and gender do not seem to matter to any of the two groups. Although theoretically, those could be postulated to have impacts on the tenure choice, results from the sample do not seem to shed much light on those effects. The results observed from the employment status is however tricky: it is negative, although significant at mostly 10% level for the EU-A10 group and not significant for the EU15 group. It would normally be expected that employment should have a positive feedback effect on homeownership. However, the results, rather oddly, do not seem to provide any evidence towards that theoretical expectation.

Following on the results from Table 4.3, a multinomial choice framework is adopted to test across all tenure choices for potential policy relationship, and to particularly shed light on the public housing element of the housing tenure probability of the EU-A10 immigrants. The results from multinomial modelling specification are shown in Table 4.4. Only estimates for the focus variable are reported; however, the specifications are identical to those in Table 4.3 columns 2 and 4.

Table 4.4: Multinomial Probit comparing EU-A10 and EU15 (Ownership, Private Renting and Public Housing)

	EU-A10			EU15		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Ownership	Private renting	Public Housing	Ownership	Private renting	Public Housing
Pre-Policy	-	-	-	-	-	-
Post Policy	-0.193***	0.104	0.089	-0.083	0.020	0.063
	(0.059)	(0.073)	(0.062)	(0.067)	(0.073)	(0.040)
Observations	828	828	828	354	354	354

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level. All models are the same specification as Table 4.3*

Overall, it can be observed that migration liberalisation changes the housing pattern of immigrants. However, the effect is not uniform across the groups. The EU-A10 group is affected more by the policy change and the effect is statistically significant. Post-2004, the EU-A10 group has experienced lower homeownership than those that came before 2004. The private renting and public housing tenure choices were more likely but not significant. These results suggest that while the 2004 migration liberalisation may be linked to a decline in homeownership probability for EU-A10 immigrants, it has also led to an increase in the public housing probability for these immigrants, however this is statistically insignificant.

Two econometric issues are further tested. First, there is the need to examine if the RDD design

is robust in capturing the effects by using a difference-in-differences (DiD) type approach as explained in equation (4.8). Second, there is also the need to examine the similarities and dissimilarities across tenure choices before and after the policy impact for both EU-A10 and EU15 with the objective of ascertaining if the EU-A10 group gradually starts resembling the EU15 group (pre-2004) in terms of tenure choice after the policy of liberalized migration in 2004.

Table 4.5 reports the results from a 2-year window for examining these effects; with a focus on ownership versus non-ownership since the results have shown a strong relationship with homeownership. Panel A, Table 4.5 shows the DiD raw coefficients as it is difficult to estimate and evaluate marginal effects of interaction terms. The DiD interaction term is negative which is similar to the results obtained in Table 4.3 and shows that EU-A10 immigrants that arrived in the UK after 2004 are less likely to own, although these effects are statistically insignificant. The results may struggle with statistical significance due to the small number of individuals hence a focus on the specification which uses a categorical variable approach with EU15 immigrants who came before 2004 as the base category.

Table 4.5: Difference-in-Differences and Categorical Treatment Variable Approach

Panel A: Binary Probit Models with Difference in Differences (Own vs non-own)

	(1)
VARIABLES	Own/non-own
Post/Pre	-0.397
	(0.351)
EU-A10/EU5	0.038
	(0.355)
Interaction	-0.398
	(0.463)
Observations	1,182
pseudo r2	0.347

Panel B: Categorical Variable Approach

	Binary Probit		Multinomial Probit		
	(1)	(2)	(3)	(4)	(5)
VARIABLES	Own/non-own	Own/Rent	Ownership	Private renting	Public Housing
EU15 Pre	-	-	-	-	-
EU-A10 Post	-0.177**	-0.193**	-0.186***	0.147**	0.039
	(0.073)	(0.078)	(0.072)	(0.072)	(0.051)
EU-A10 Pre	0.010	-0.024	0.006	0.070	-0.076
	(0.093)	(0.098)	(0.092)	(0.094)	(0.058)
EU15 Post	-0.099	-0.110	-0.103	0.048	0.055
	(0.089)	(0.097)	(0.086)	(0.090)	(0.066)
Observations	1,182	937	1,182	1,182	1,182
pseudo r2	0.347	0.366	-	-	-

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level. All models are the same specification as Table 4.5*

In Panel B of Table 4.5, it can be observed that compared to migrants from EU15 who came before 2004, the migrants from EU-A10 are less likely to be homeowners even after the liberalized migration policy. The private renting tenure shows positive feedback effect, which is expected for the new migrants.

In Table 4.6, similar tests are carried out as in Tables 4.3, 4.4 and 4.5 but within a 3-year window i.e. comparing pre and post-policy patterns allowing for the policy impacts to have been felt over a longer time (similar to what is done in Gonzalez, 2013). The years of stay is also included as a control which should matter when a relatively longer timeframe is being considered.

Table 4.6: Three yearly policy effectiveness window
Panel A:Binary Probit Models (comparing EU-A10 and EU15)

	EU-A10		EU15	
	(1)	(2)	(3)	(4)
VARIABLES	Own/non-own	Own/non-own	Own/non-own	Own/non-own
Pre-Policy	-		-	
Post Policy	-0.187***	-0.168**	-0.122**	0.051
	(0.050)	(0.075)	(0.055)	(0.084)
Years of stay	NO	0.007	NO	0.058**
		(0.020)		(0.025)

Observations	1,199	1,199	527	527
pseudo r2	0.343	0.344	0.477	0.494

Panel B: Binary Probit Models with DiD approach (Own vs non-own)

	(1)	(2)
VARIABLES	Own/non-own	Own/non-own
Post/Pre	-0.586**	-0.381
	(0.280)	(0.354)
EU-A10/EU5	-0.242	-0.220
	(0.286)	(0.284)
Interaction	-0.234	-0.260
	(0.379)	(0.380)
Years of stay	NO	0.068
		(0.079)
Observations	1,726	1,726
pseudo r2	0.363	0.347

Panel C: Binary Probits with Categorical variable treatment

	(1)	(2)
VARIABLES	Own/non-own	Own/non-own
EU15 Pre	-	-
EU-A10 Post	-0.246***	-0.196***
	(0.056)	(0.075)
EU-A10 Pre	-0.063	-0.056
	(0.074)	(0.071)
EU15 Post	-0.146**	-0.094
	(0.071)	(0.089)
Years of stay	NO	0.014
		(0.016)
Observations	1,726	1,726
pseudo r2	0.363	0.365

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level. All models are the same specification as Table 4.5 (controlling for years of stay in some models)*

From panel A, it can be observed that the policy change is negative and significant, and this is quite similar to both EU-A10 and EU15 groups (comparing column (1) with column (3)). However, this does not hold true when the years of stay control variable is introduced (columns 2 and 4). The policy effect is mainly significant for the EU-A10 group and insignificant for the EU15 group. It is also interesting to note that years of stay becomes significant for the EU15

group, which is as expected[45]. Panel B of Table 4.6 reports similar exercises that were performed with 2-year window models in Table 4.5. The results from the difference-in-differences (Panel B) and categorical variable models (Panel C) are qualitatively similar to the results observed from Table 4.5 with or without the years of stay controls[46].

There can also be sufficient reason to suspect that the results are driven by other policies or factors not directly observed or accounted for in the context of this study. This can lead to spurious results. Therefore, a placebo test framework has also been designed to examine if the policy effect that have been observed so far across those econometric exercises indeed hold true. This placebo is also useful for investigating the likelihood of other unobserved factors and controlling for omitted variable bias. The ideal placebo would require an experimental setting where an artificial treatment is administered to a group that hitherto did not receive the treatment. However, the data setting makes this approach impossible. An alternative approach is therefore adopted which has been used in Draca et al. (2011) where they use a falsified policy impact year (a year when no significant policy changes existed) to test the validity of their results (see Draca et al., 2011 for notes on the implementation of this strategy). In this case, 2008 is used as a placebo policy change year[47], which is sufficiently after 2004 and not any of the years before 2004 which might have had other relevant policy or background discussion leading up to 2004 EU accession policy. The results are reported in Table 4.7 and show no significant effects in 2008, which confirms that placebo is not a concern.

[45] The years of stay have been included in the 2-year window models and the results did not show any significant departure from previous results.
[46] Further tests have been conducted on the models using 1-year policy window (one year before and one year after 2004) and the results are quite similar.
[47] The research reveals that there were no major policy changes around 2008 that would have affected EU-A10 and EU15 immigrants.

Table 4.7: Placebo test with 2008 falsified policy change year (binary probit models)

	1 yearly				2 yearly				3 Yearly			
	EU-A10		EU15		EU-A10		EU15		EU-A10		EU15	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	own/non-own	own/rent	own/non-own	own/rent	own/non-own	own/rent	own/non-own	own/rent	own/non-own	own/rent	own/non-own	own/rent
Pre-Policy	-	-	-	-	-	-	-	-	-	-	-	-
Post Policy	0.042	-0.001	-0.015	0.063	-0.001	-0.027	-0.066	-0.082	-0.049	-0.099	-0.065	-0.087
	(0.063)	(0.073)	(0.096)	(0.079)	(0.053)	(0.055)	(0.055)	(0.062)	(0.056)	(0.061)	(0.053)	(0.060)
Observations	210	178	126	118	668	512	317	273	1,130	851	457	387
pseudo r2	0.389	0.445	0.564	0.623	0.332	0.401	0.436	0.424	0.342	0.393	0.437	0.418

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level. All models are the same specification as Table 4.5*

The results from the empirical analysis appear to be in tandem with hypothesis 1- immigration liberalisation leads to negative selection of immigrants of lower socio-economic status which leads to a lower homeownership probability. The empirical evidence suggests that the liberalisation lead to an increase in the number of immigrants with lower educational attainment, lower income and wealth; and this may lead to lower credit history, down payment constraint and difficulty of securing mortgage facilities- factors which exacerbate housing unaffordability. These findings point to an indirect impact of the migration policy changes on the housing tenure pattern of immigrants. The results however do not fully confirm the second hypothesis- the negative selection of immigrants which is associated with liberalised migration increases immigrants' propensity for public housing. While the hypothesised positive effects are observed, these effects are generally statistically insignificant.

4.6 Summary and Conclusion

Migration policy is a frequently and fiercely debated topic in economics and politics across most parts of the world. One of the key concerns in the debate is the economic outcomes, including labour market and housing outcomes, of the immigrant population. This chapter focuses on the housing outcomes of the immigrant population, particularly the housing tenure outcomes. Specifically, the study analyses the link between the EU-A10 accession and the housing pattern of EU-A10 citizens that immigrated to the UK between 2002 and 2005 (two years before and two years after the liberalization). The dataset used in this study (UK Longitudinal Survey – Understanding Society) has many observed individual and household characteristics over several years, which enables the control for confounding factors over time. This topic is worth investigating considering the implications to other countries facing similar migration policy issues.

Previous research has shown that immigrants generally have lower homeownership prospects compared to their native counterparts. This study shows that immigrants that migrated under a liberalised migration policy system may be even more disadvantaged than their counterparts who migrated under a more restrictive policy framework. This disadvantaged position is theoretically linked to affordability which is dependent on house prices, access to finance, cost of finance, household income and debt. Thus, if an immigration wave is dominated by immigrants of lower educational attainment and skills, there is a high chance that this immigrant cohort will generally earn lower income, have a higher debt profile and poor credit history which will make mortgage finance more difficult and costly, thus decreasing homeownership prospects.

Following a carefully developed framework and extant literature review, it is anticipated that the liberalisation of immigration for EU-A10 citizens may have created a wave of immigrants with relatively lower socio-economic status, who are more likely to have a lower educational attainment or be engaged in low-skilled employment, and thus have a lower income, poor credit history and down payment constraint which will hinder their prospects of securing mortgage facilities. It is therefore hypothesised that this disadvantaged socio-economic position may engineer a lower rate of homeownership and a higher level of private renting and public housing for EU-A10 immigrants that migrated after 2004.

Using rigorous techniques (similar to Regression Discontinuity Design (RDD) and Difference-in-Differences (DiD) approaches), and controlling for socio-economic factors, the result are generally as hypothesised. The results specifically show that citizens of the EU-A10 countries who immigrated after the 2004 accession have a statistically significant lower likelihood of homeownership (19% lower), and an economically, albeit statistically insignificant, higher rental (10% higher) and public housing (9% higher) probability. These results are consistent across econometric specifications dealing with various potential biases, robustness and sensitivity tests. The results also reveal that educational

attainment, household income, and living with spouse make EU-A10 immigrants generally more likely to become homeowners. Thus, the lower likelihood of homeownership for the post-2004 EU-A10 cohort may be attributed to their lower educational attainment, lower skillset and lower household income (as posited in Campbell *et al.*, 2014; and Migration Watch UK, 2015).

The results support the argument that liberalised migration may translate to stronger migration pull forces (Borjas, 1987) which may particularly attract immigrants of lower socioeconomic status (as shown in Abrahámová, 2007; Rodrik, 2011; and Ejermo and Zheng, 2018). These results may also imply that migration liberalisation does not necessarily imply adverse impact on migrants' homeownership likelihood; rather, the migration restrictions tend to select more educationally and financially endowed migrants, who will have stronger financial positions required to transit to homeownership more easily than their counterparts that migrated under more liberalised systems.

The study also examines the possibility that the 2004 accession played a significant role in making the EU-A10 immigrants become more similar to the EU15 immigrants after the accession; and the results reveal that the housing tenure patterns of migrants from the EU-A10 countries have become similar to the housing tenure patterns of the immigrants from the older EU15 countries. While the results show a higher homeownership probability for EU15 over the EU-A10 immigrants, these effects are statistically insignificant. The results further show that immigrants from two countries operating under an identical migration policy framework, despite having different migration pull/push forces are likely to have similar housing patterns.

Despite the fact that this study is somewhat limited by a small sample size, the hypotheses have been tested variously with econometric rigor which has led to robust conclusions. This research provides a deeper understanding of the potential link between migration policy, housing choices and outcomes; and this understanding is important for analyzing the potential relationship between migration policy and immigration waves on household mobility, housing demand, rents and house price dynamics in

metropolitan and regional markets. This insight is important for forecasting and predicting the demand for the public amenities and infrastructure. The insight provided in this study also has implications on labour markets, household consumption and investment, wellbeing and inequality; and these have social and economic implications which are important in contemporary migration policy debates.

This chapter has made an important contribution by providing further insight on the housing pattern of immigrants resulting from migration policy changes. Another important aspect of the migration debate is the variation in the housing patterns of natives and non-natives. This is an important perspective because it sheds light on the social and economic integration of immigrants in comparison to their native counterparts. The next chapter therefore focuses on the variations in the housing tenure outcomes of natives and non-natives.

CHAPTER FIVE

The Variation in the Housing Outcomes of natives and non-natives: Evidence from Britain[48]

5.0 Introduction

Having analysed global migration trends in the first chapter and subsequently analysed the link between migration policy and the housing tenure and locational patterns of immigrants, this chapter (the final empirical chapter of the thesis) investigates the housing patterns of immigrants (in general) and compares their housing tenure outcomes to the housing tenure patterns of natives and second-generation migrants.

The study of the housing tenure patterns of immigrants directly or indirectly captures both migration policies and the housing policies of the destination country. While it is important to pay close attention to the entry conditions of immigrants, it is equally important to pay attention to the integration of immigrants in the destination countries as a way of promoting socio-economic integration and minimizing inequality. Housing is an important element of immigrants' integration; thus, well researched evidence-based housing solutions are necessary for improving the process of immigrants' integration and acculturation in the destination country.

In order to develop the necessary solutions for improving the integration of immigrants in the destination countries, there is the need gain adequate insight on housing-related integration issues. This study therefore examines the variation in the housing tenure outcomes of natives and the non-natives in Britain. The important contribution which this study makes relates to the heterogeneous modelling approach in analysing natives and generations of non-natives in a way that has hitherto not

[48] This paper has been published in the International Journal of Housing Markets and Analysis- included in the reference section as Oladiran, Nanda, and Milcheva (2019)

been examined. In line with the aim of the study, the following research objectives are explored:

i. To examine the variation in the housing tenure outcomes of natives and non-natives;

ii. To analyse the variation in the impact that key economic and non-economic factors have on natives and non-natives;

iii. To analyse the variation in the application of the lifecycle theory to the housing tenure outcomes of natives and non-natives;

iv. To analyse regional variations in the housing tenure patterns of natives and non-natives

5.1 Background and Motivation of the Study

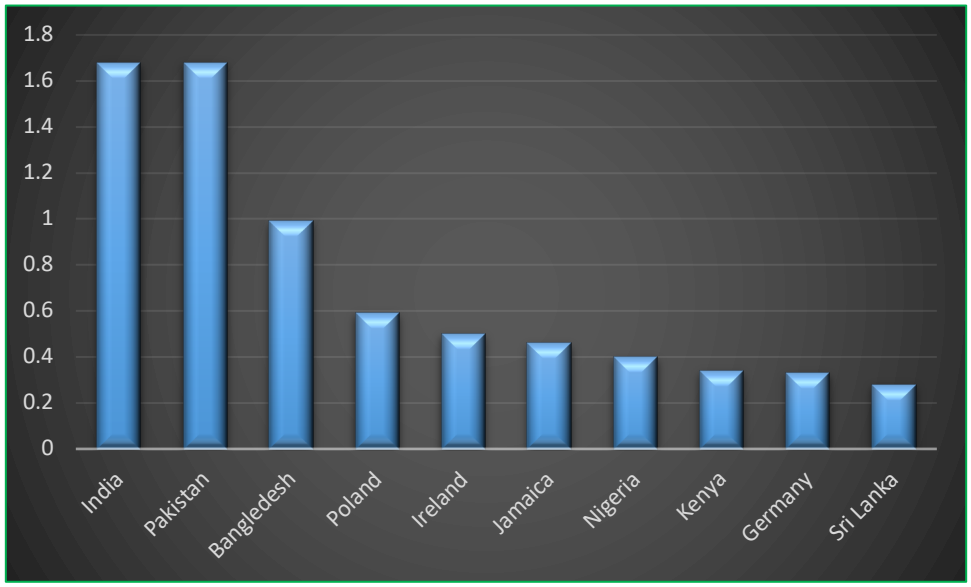
The recent change in the pace and breath of migration in Britain are significantly changing the outlook and urban landscape, notably the housing market. Britain attracted a high number of immigrants from around the world in the last half century which has led to extensive policy formulation and modification, as well as economic and political debates (The Migration Observatory, 2016a and 2016b), culminating in the Brexit vote[49]. Recent projections (as shown in figure 1.1) however suggest that despite Brexit, approximately 60% of the projected population growth in Britain by 2040 is expected to be driven by migration which will have significant implications for the UK housing market.

Britain has traditionally attracted a proportionately high number of migrants from South Asia, Africa and Europe (as shown in Figure 5.1); and it is no coincidence that these countries are predominantly former British colonies which may be linked to the 1948-1972 Commonwealth immigration wave and

[49] The UK referendum on EU membership in June 2016 which saw the majority of the UK population voting to exit the EU.

EU immigration (reference can be made to the migration policy evolution in Britain discussed in chapters three and four).

Figure 5.1: Top 10 Countries of Origin of British Migrants-2009-2017 (% of total Migrant stock)



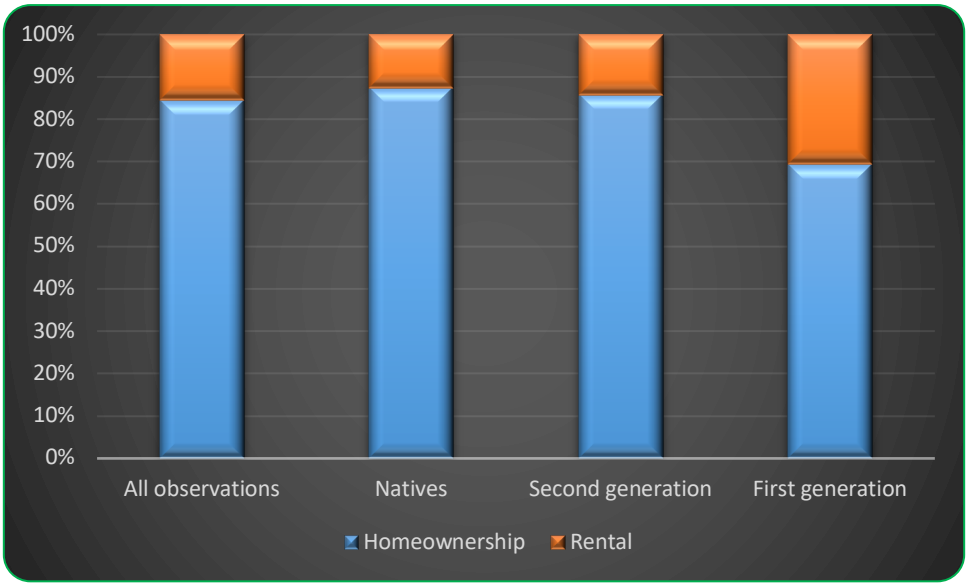
Source: Author's drawing based on data from University of Essex, 2017.

Housing is a key element of migrants' journey; hence Britain's housing pattern is constantly evolving with waves of immigration. One of the key housing market dynamics caused by immigration to Britain is the variation in housing tenure patterns for natives and non-natives[50]. The variation in housing tenure

[50] A lot of debates surround the classification of natives and immigrants, particularly relating to the children of immigrants. Migration economists conventionally adopt the implicit use of the term "immigrants" as individuals that reside in a different country from their country of birth, and natives are intuitively classified as individuals residing in the country that they were born. However, these classifications are questionable, particularly if an individual, though residing in the same country that he/she was born, has immigrant parents. The key contention is that the classification of immigrants as individuals residing in a country different from their country of birth excludes their children, and though born in the country of residence, their children do not automatically qualify as "natives". This is exacerbated by the evidence that children born to immigrant parents usually have different life pathways in terms of their educational performance, acculturation adaptation, language, local knowledge, physical, psychological and labour market outcomes from their parents and from other children born to natives (Keeley 2009; Behtoui and Olsson 2014). This has advanced the definition of nativity beyond place of birth to parental place of birth also. Keeley (2009) offers what appears to be a clear and simple definition of immigrants and their children that were born in the country where they settled by classifying migrant "generations". He classifies first generation immigrants as individuals born in a different country from their country of residence and second-generation immigrants as those whose parents were born in another country but who themselves were born in the country where their parents settled. This implies that only individuals born in the country of residence to parents who were also born in the same country can be categorised as natives.
Rumbaut (2004) however argues that place of birth and parental nativity alone may be insufficient in determining migration generations. He argues that the life stage or age at the time of immigration may be key in determining their migration generation, suggesting that the "whole number" classification of first-generation migrants, second generation migrants and natives (as adopted in Keeley, 2009) may insufficiently account for this complexity. He therefore proposes a further decomposition of first generation migrants based on their age at migration and re-categorises natives and migrants in what can be termed "decimal calibration" (1.0 for those who migrated at over age 18; 1.25 for those who migrated from age 13-17; 1.50 for those who migrated from age 6-12; 1.75 for those who migrated from age 0-5; 2.0 for those born in the resident country to immigrant parents; and 3.0 to individuals born in the resident country to native parents) which captures nativity, parental background and life stage when migration occurred. This research however adopts the traditional whole number classification (similar to Keeley, 2009) to maintain simplicity; the decimal classification test is therefore encouraged in further research.

outcomes for natives, second-generation migrants and first-generation migrants as shown in Figure 5.2 reveals that first-generation migrants have different homeownership/rental outcomes from the general population. Specifically, this evidence reveals that the proportion of homeowners[51] is much higher for natives than for non-natives[52], suggesting that an increase in immigration may lead to growth in the demand on the rental market at a higher rate than the sales market and mortgage markets.

Figure 5.2: Homeownership/Rental Outcomes in Britain (2009-2017)



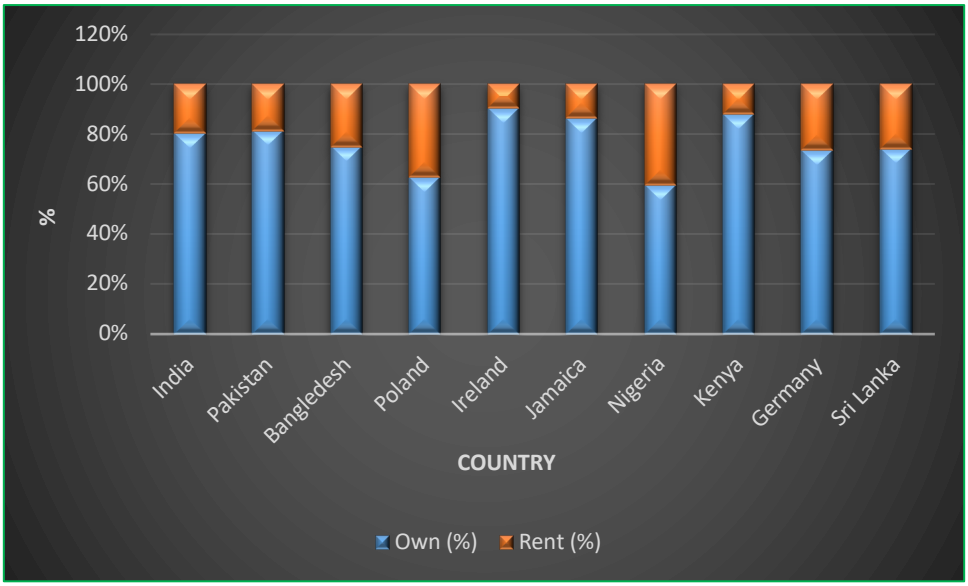
Source: Author's drawing based on data from University of Essex, 2017.

Scholars (such as Rumbaut, 2004; Keeley 2009; and Behtoui and Olsson 2014) further suggest that it may be worthy to analyse second-generation migrants as a separate cohort from first-generation migrants, and natives. However, there is an absence of empirical evidence in this regard in Britain. This study therefore aims to fill this gap by taking account of this cohort variability in the empirical analyse of housing tenure variations, and to further analyse the mechanism and factors driving these variations for natives, first-generation and second-generation migrants in Britain.

[51] Relative to renters
[52] First and second-generation migrants

Further evidence reveals that housing tenure differs significantly across the migrant groups in terms of country of origin (as shown in Figure 5.3).

Figure 5.3: Housing Tenure (Homeownership to Rental) Outcomes for the Top 10 Countries of Origin of British Migrants (2009-2017)

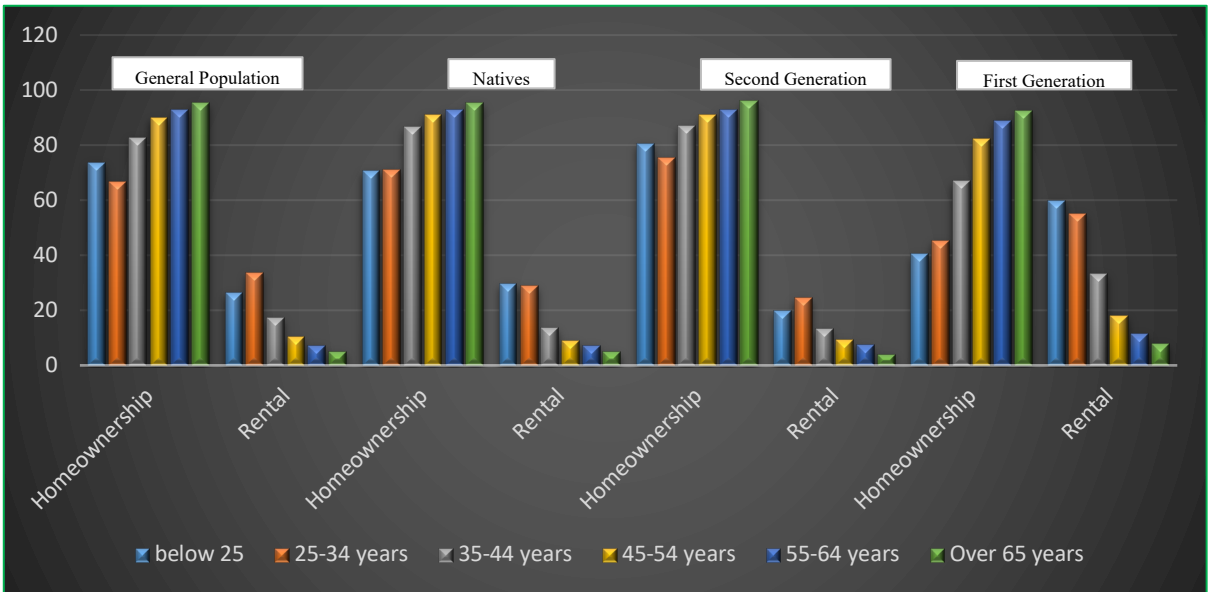


Source: Author's drawing based on data from University of Essex, 2017.

At the same time, figures 5.4 shows that the housing outcomes and pathways vary by lifecycle phase and associated parameters; and figure 5.5 also shows a variation based on the migration lifecycle[53] of the first-generation migrant cohort.

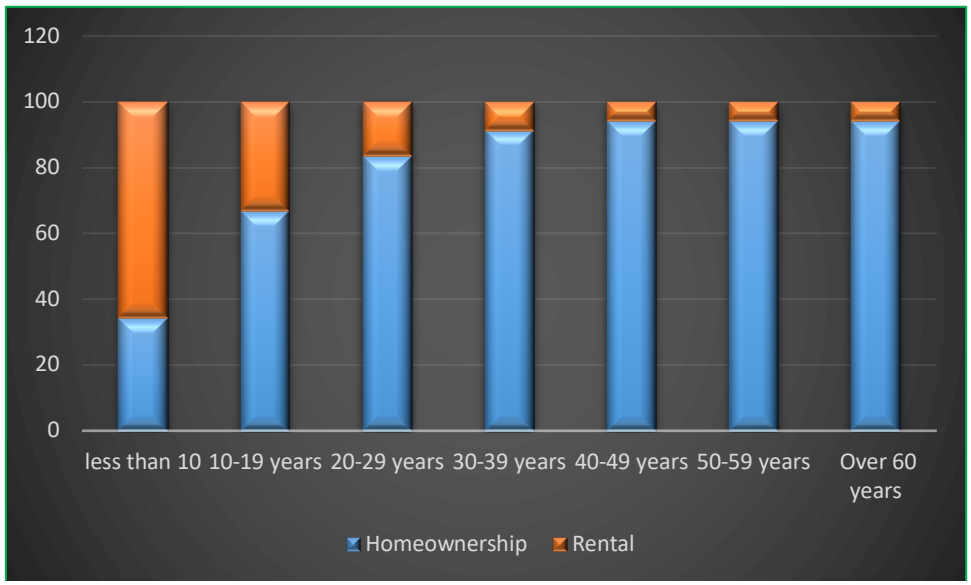
[53] The number of years spent in the destination country

Figure 5.4: Lifecycle Effects on Housing Tenure Outcomes of Natives and non-natives in Britain (2009-2017)



Source: Author's drawing based on data from University of Essex, 2017.

Figure 5.5: Accommodation of Foreign-born by Migration Lifecycle-2009-2017 (time spent in the UK)



Source: Author's drawing based on data from University of Essex, 2017.

In addition to the descriptive statistics (Figures 1 to 5), the report in Barton (2017) provides some more valuable insight on the housing tenure pattern of the UK general population, as well as other regional

and demographic variations of immigrants. The report shows a general decline in homeownership and public-rented housing in the UK, and a proportional increase in private-rented housing; and also shows a variation in intensity across regions and migrant generations. For instance, the decline in homeownership was more severe in London and North of England (between 1996 and 2016), and this is indicative of the acute affordability challenge for which London is renowned. Further evidence reveals that the South of England and Wales experienced a boost in homeownership in the same period. The report also shows that public-rented housing is more common in Scotland, North of England and London, although, there was a decline in the number of public renters, particularly in the North of England over the same period. In the same line, private renting has grown across the UK and is currently the preference in London.

Barton (2017) also provided insight on lifecycle and racial variations. It specifically reveals that individuals aged 16-34 are increasingly less likely to be homeowners and this aligns to other recent findings. The report also revealed that whites, and some Asian ethnicities are more likely to be homeowners in the UK compared to other racial groups. Further interesting insight is also given for immigrants, and this is particularly relevant to the research subject. The result shows that immigrants are less likely to transit to homeownership compared to their contemporary natives and second-generation immigrants.

The variations discussed as well as those shown in Figures 5.2, 5.3, 5.4 and 5.5 are merely descriptive and thus insufficient basis for projections, forecasting, planning and policy formulation. This therefore creates the need for further empirical analysis which this empirical chapter aims to address.

The projected increase in the population growth attributable to immigration (as shown in Figure 1.1) suggests that immigrants will have a significant impact on housing over the next century. It is therefore important to analyse previous and present migration effects on housing tenure in order to adequately make provision for the expected changes from the imminent immigration. Furthermore, housing tenure

models in previous studies are seldom analysed in heterogeneous models (separating native and non-native cohorts in different models), and the results obtained from homogenous models may be less precise, particularly in application to certain migrant cohorts. Analysing natives and non-natives' housing tenure outcomes in separate models may therefore improve precision and by effect, enhance clarity in forecasting, planning and formulation of policies. Furthermore, with an obvious gap in housing literature regarding the presence or absence of a variation in housing outcomes based on the traditional migration generations, this study makes an important contribution by examining the variations in the housing tenure patterns based on natives and migrant generations.

This chapter therefore empirically analyses the key factors which may be driving the variation in housing tenure outcomes (particularly homeownership and rental) for natives and non-natives. These factors are tested using heterogeneous models. The specific question asked is: which factors are likely to increase or decrease the probability of homeownership and renting for natives and non-natives? It is expected that this process will improve insight on the variation in the housing tenure outcomes of natives and non-natives and guide policy formulation.

5.2 Literature Review

5.2.1 Conceptual and Theoretical Framework

There is a significant body of literature on variation in housing tenure choices and outcomes, and a vast proportion of these literature focus on ethnic and racial variations. While these studies (such as Skifter Andersen et al. 2016) reveal homeownership variation on ethnic and racial basis, they fail to account for key immigration effects. This has been addressed with studies (such as Coulson 1999; Painter et al. 2001; Borjas 2002) modelling homeownership variations between ethnic groups, while accounting for immigration effects. However, these studies adopt homogenous modelling which may

fail to capture the different effects of key factors that may be influencing housing tenure outcomes on the different migrant generational cohorts. While Coulson (1999) adopts heterogeneous modelling, the focus is on the variation in the effects of key variables on different ethnic groups, rather than migrant cohorts. However, analysing ethnic variations in housing outcomes may still be insufficient because there may be more fundamentally different effects within these ethnicities based on their immigration generation. For instance, a native of a particular ethnic group (black British for instance) may act differently from a first-generation or second-generation migrant of the same ethnic group. This is a key research gap that this study aims to fill, particularly by adopting heterogeneous modelling and accounting for the second-generation migrants who are often not the subject of housing research. The proposition is that the key factors that influence housing tenure outcomes will have varying degrees of impact on members of the different native and non-native generations, hence delineating the sample into optimal subsets in this analysis may offer better insight and accuracy to predicting housing tenure outcomes.

5.2.2 Determinants of Housing Tenure Outcomes

Housing tenure outcomes are traditionally linked to socio-economic, locational, individual, household, demographic and sociocultural factors. The existing scholarly perspectives on these factors are summarised, and these serve as the theoretical underpinning for this research. The gaps in knowledge are also identified further with highlights on how the contribution in this study addresses these gaps.

5.2.2.1 Socio-economic effects

Literature reveals that socio-economic factors are key in determining housing outcomes (Kuebler and Rugh, 2013; Gyourko and Linneman 1999). Housing tenure outcomes are theoretically linked to affordability, specifically household income, labour market conditions, house prices, and credit constraint. However, these are rarely analysed in the context of nativity and migration. Studies such as

Zorlu et al. (2014) however investigate the variation in homeownership rates for natives and non-natives. They find that human capital endowment of individuals such as education, work experience, income generation capability and positive inclination to invest in housing are key drivers of homeownership. Coulson (1999) further reveal that house values, home purchase cost, educational attainment, and information asymmetry in the housing market also influence housing tenure choices. They however observe that income effects are inconsistent because despite having higher income than blacks, Hispanics and Asians, for instance, have lower homeownership rates.

Hall and Greenman (2013) offer more perspectives on socio-economic effects by showing that legal status of immigrants (being an undocumented/ illegal immigrant) may further exacerbate their socio-economic status. They suggest that illegal immigrants find it more difficult to secure employment and receive lower wages, thus finding it difficult to secure mortgage facilities. Painter et al. (2001) further show that educational attainment may be a key determinant of housing outcomes. This may be because individuals with lower educational status may be less competitive in the labour market thus earning lower income than their counterparts.

The foregoing highlights the importance of socioeconomic factors in determining housing tenure outcomes. The modelling approach in this study will therefore test for the impact of the key factors discussed. It is also important to note that a vast proportion of the cited literature are in the United States context. Nygaard (2011) makes a reasonable contribution towards a different geographical context- the UK. However, the analysis focuses on racial cohort variations, leaving a knowledge gap with regards to the effects of socio-economic factors on migration generation in the UK. This study will address this gap by testing the variation in the effects of key socio-economic factors on migration generations.

5.2.2.2 Effects of location characteristics

Scholars also attribute housing tenure variation to locational and housing factors. Borjas (2002) appears to offer the first explicit articulation of a systematic variation in homeownership rates across cities, a perspective which was not widely stressed in previous literature. The study attributed the metropolitan variation to the structure of housing market and regional differences in housing cost. The results show that there are differences in locational choices made by natives and immigrants, and these affect their homeownership choices.

Borjas (2002) further attributes housing tenure variation to the more micro-level effects such as local and neighbourhood factors, particularly revealing that the growth of ethnic enclaves in major cities increase the probability of homeownership for immigrants. Recent research also attribute homeownership outcomes to the proportion of immigrants in a neighbourhood, housing quality, crime rate, safety, services, infrastructure, housing deficiency in a neighbourhood and the dominant housing tenure in the neighbourhood (Zorlu et al. 2014; Hall and Greenman, 2013). Additionally, Skifter Andersen et al. (2016) analyse locational effects in European cities and support the assertion that locational factors influence housing tenure outcomes. The study of Nygaard (2011) which is identified as making a key contribution to the subject area in the UK however fails to account for these locational effects. This study will therefore attempt to improve on this by incorporating locational effects at regional level.

5.2.2.3 Effects of individual, household and demographic attributes

Individual, household and demographic attributes have also been identified as key factors influencing housing tenure outcomes. Borjas (2002) and Zorlu et al. (2014) identify individual tastes, preferences, social networks, household attributes and country of origin as key factors that impact housing tenure choices. For instance, Zorlu et al. (2014) reveal that Moroccans have a higher homeownership rate

than Turkish immigrants in the Netherlands resulting from individual characteristics, household characteristics, family structure, marital status, parental background, neighbourhood factors, financial awareness, and their perception and attitude towards homeownership in their home country. However, their categorisation may be flawed because they classify all individuals who have identified themselves as Turkish as immigrants, thus ignoring the possibility that some of them may have been born in Morocco which makes them second-generation migrants.

Scholars (such as Nygaard, 2011; Zorlu et al. 2014; and Skifter Andersen et al. 2016) also reveal that demographic factors such as gender, race, ethnicity and age influence housing tenure outcomes. Åslund (2005) specifically finds that households with male heads have lower homeownership probability, and Kuebler and Rugh (2013) observe a variation in homeownership differences between Whites, Asians, Mexicans and Cubans. Kuebler and Rugh (2013) however acknowledge that socio-economic effects may be stronger that demographic effect. It will therefore be worthy to compare these effects across migrant generations. A common trend in these studies is their dual classification (natives and immigrants/foreign-born) which fails to account for the heterogeneity of second-generation migrants.

5.2.2.4 Lifecycle Effects (natural and migration lifecycle)

Clearly, scholars focus on socio-economic, locational, demographic, individual and household attributes as key determinants of housing choices. While most of these studies account for the impact of age (typically by controlling for age in their models) majority of these studies do not appear to highlight and explicitly articulate the fundamental role of the lifecycle stage of an individual in determining his/her choices and life decision such as housing.

Classical economics literature suggest that individual circumstances, choices, consumption and savings decisions are a lifecycle function. The lifecycle theory, based on the classic of Modigliani and Brumberg (1954) suggests that an individual's lifecycle position (stage of life defined by age) is a key

determinant for savings, consumption and other economic decisions (Mariger, 1987; Megboluge and Linneman, 1993; Tin, 2000; Wakefield, 2009). Housing tenure studies however fail to explicitly account for the fundamental role of the lifecycle in their models. The application of this theory is vital for analysing housing tenure because it suggests that certain age cohorts have different propensities for certain outcomes (e.g. renting and owning), and this should be explicitly articulated in housing tenure research.

In conventional modelling, age is applied as an in-level variable, and in some other instances, the age variable is squared in order to account for the expected non-linear effect of age on housing tenure choice. While these may be reasonable applications from an econometrics point of view, they do not create the opportunity to test lifecycle effects. The research of Painter et al. (2002) attempts to close this gap by analysing the probability of belonging to an age group 25-34 and also being in homeownership relative to rental housing and comparing this probability to those in age group 18-24, 35-44, 45-54, and 55-64. Suffice to state that while they clearly apply the lifecycle theory, they do not make an explicit link to the lifecycle theory. Regardless, their results are consistent with theory- individuals' homeownership prospects increase as they advance in their lifecycle. Their results further reveal that the increase in the homeownership prospect slows down at the latter stages of the lifecycle. This age grouping appears appropriate- they exclude individuals below the age of 18 probably because individuals in this age group may be unable to make their personal housing decisions. However, they also exclude individuals aged over 65 with no justification. The study in this chapter therefore adopts the age classification in Painter et al. (2002) and includes individuals that are over 64 years of age in order to account for a wider population demographic.

It is still not clear if the lifecycle theory has an identical application to natives, first-generation and second-generation migrants, though descriptive evidence in (Figure 5.4) suggests that the lifecycle

effects may vary across migration generations. Empirical modelling is therefore required to test for the variation in the lifecycle effects across migration generations.

Despite the fundamental role of the lifecycle effects in housing choices, decision and outcomes, there is the possibility that it may have a different application to the first-generation migrant cohort whose decisions transcend the natural lifecycle effects (age). The hypothesis is therefore that the migration lifecycle (number of years spent in the resident country) effects (as shown in Figure 5.5) may be a stronger determinant of housing outcomes of first-generation migrants– a view that is hardly articulated in the literature.

Figure 5.5 reveals that the homeownership prospects increase as immigrants advance in the migration lifecycle, while rental tenure propensity diminishes. This further suggests that new immigrants are more likely to rent than to buy houses upon arrival in the destination country. New immigrants (regardless of their age) typically need a few years to settle down in the destination country and may find it difficult to access mortgage funding and other facilities due to a lack of credit history, security verification and other socio-economic challenges, thus making early homeownership difficult. This may also be the reason for the higher rental rates for immigrants in the early stages of the migration lifecycle. It can therefore be inferred that the natural lifecycle may have a stronger impact on natives and second-generation migrants than for the first-generation migrant; and the migration lifecycle may have stronger effects than the natural lifecycle for first-generation immigrants.

Some key studies (such as Coulson, 1999; Borjas, 2002) fail to account for the years spent in the resident country, while some scholars include some elements of the migration lifecycle in their models, however they articulate and apply it differently. For instance, Nygaard (2011) analyses year of entry into the UK as a cohort effect, thus only considering those who migrated between 1994 and 2006. While the cohort effect is a valid consideration, it does not capture the broad-ranging migration lifecycle effects and the results are not explained in this context either. Painter et al. (2002) also capture

the years spent in the resident country, however their analysis does not contextualise the migration lifecycle effect.

The context and application of the migration lifecycle is important because it accounts for the years spent in the destination country, rather than merely cohort effect. Furthermore, the phrase "migration lifecycle" appears appropriate because it has similar parameters and unit of measurement as the natural lifecycle[54]. Thus, while the natural lifecycle measures the number of years a person has lived on earth, the migration lifecycle captures the number of years a person has lived in a destination country (which are often different for the first-generation migrant cohort). This study therefore also aims to compare the migration lifecycle effect with the natural lifecycle effects while controlling for other factors in order to identify the key drivers of housing tenure outcomes for first-generation migrants[55].

Based on this review, socio-economic, demographic, sociocultural and locational factors appear to be the key focus of scholars in the study area, and the underlying naturally lifecycle effects are typically not adequately articulated or controlled for. Furthermore, the migration lifecycle effect is often not explicitly acknowledged or articulated. The lifecycle theory will therefore underpin the empirical analysis in this study, and the migration lifecycle effects will further serve as the basis of the analysis for the first-generation migrants.

While descriptive evidence may exist in respect to some aspects of the literature gaps highlighted, empirical evidence is mixed in the literature. Without rigorous empirical tests, predictions of theoretical models remain at best well-seasoned speculation, and not suitable to guide policy (Dustman *et al*., 2005), thus, this chapter will provide empirical evidence revealing factors which may be driving the variation in housing outcomes for natives and non-natives in the UK using longitudinal data. The

[54] Unit of measurement is the number of years and it captures the fact that a new life starts in the foreign country for many migrants, starting from scratch and embarking on building a new life.

[55] It has been argued in chapters 2 and 3 that the migration lifecycle may be highly correlated with the natural lifecycle (age). However, the high correlation may be because the immigrants analysed in chapters two and three arrived in the UK within the same time window (2 yearly or 3 yearly windows) which implies that they would all be at similar stages of their migration lifecycle. The sample in this study however has an open-ended year of entry which minimises the potential effects that being in the same migration window may produce.

focus of this chapter is private housing tenure outcomes only[56]. The key reason for the exclusion of social/public housing tenure from the study is that a vast majority of first-generation migrants are restricted by "no recourse to public funds"[57], and inclusion of social housing may bias the estimates. Furthermore, the research design in this study enables an observation of the extent to which second-generation migrants compare to natives or first-generation migrants and whether it is more appropriate to classify second-generation migrants as natives, migrants or as a separate unique cohort in terms of housing outcome.

5.2.3 Hypotheses

Hypothesis 1: A distinct variation exists in the housing tenure patterns of natives, first-generation and second-generation migrations; and none of these groups of immigrants have identical housing tenure patterns. Theoretically (and based on the descriptive evidence), it is expected that a distinct variation should exist in the housing tenure patterns of natives and non-natives (first and second-generation migrants). It is indeed tricky to form a specific expectation for the housing tenure patterns of second generation migrants because of the mixed expectation: first, as children of immigrants, they should behave like immigrants and not so much like natives; and second, because they were born in the destination country, there should have a higher level of acculturation compared to their immigrant parents, hence an expectation that they should behave like natives. The empirical analysis will however offer better insight on this.

Hypothesis 2: The key factors influencing housing tenure outcomes have varying degree of effects on natives, first-generation and second-generation migrants.

Hypothesis 3: The natural lifecycle will play a more significant role in determining the housing tenure outcomes of natives and second-generation migrants. It is further expected that the lifecycle effects

[56] Homeownership relative to rental.
[57] Clause on visa issued implying lack of access to social/public housing (among other public benefits)

will be less influential for the first-generation migrants, while the migration lifecycle is expected to play a significantly stronger role in influencing the housing tenure patterns of first-generation migrants.

5.3 Data and Methods

This section describes the data, empirical methods and the methodology adopted in the study.

5.3.1 Data description

The UK Household Longitudinal Study (UKLS) data (covering the period of 2009-2016) is used for the analysis in this study (the same dataset is used in Chapters three and four). The UKLS data is an extension of the British Household Panel Survey (BHPS) which ran from 1991 to 2008. This dataset has been used by several scholars (such as Benito, 2009; Koblyakova, Hutchison and Tiwari, 2014; Tumen and Zeydanli, 2014) to model pathways of individuals and households, and in some cases, to test lifecycle effects in the UK. According to the University of Essex (2017), the UKLS data is an extract from the Understanding Society Survey- a nationally representative survey of UK households which tracks individuals and households. It contains a household-level questionnaire and an individual questionnaire for each adult member of the household. This is the largest longitudinal study in the UK and provides crucial information for researchers and policy makers on the causes and consequences of change in peoples' lives. It is multi-topic, conveying a range of social, economic, and behavioural factors, with questions covering family life, education, employment, and finance. Furthermore, the nature of the data, in terms of both the data collection process and the information available is similar to the US Panel Study of Income Dynamics (PSID), the Household Income and Labour Dynamics Australia (HILDA), German Socio-Economic Panel (SOEP), and Survey of Family Income and Employment (SoFIE) in New Zealand.

Stratified and clustered sampling are combined in the sample design, with an equal probability sample of residential addresses for sample subjects in England, Wales and Scotland. At national level, the population is divided into mutually exclusive and exhaustive strata: each of the 12 regional geographical units having three occupational bands (total of 36 bands), and each of these occupational bands having three population bands, hence a total of 108 strata are created. The population is further divided into clusters of postcode sectors called PSUs (Primary sampling Units) totalling 2640, and a few clusters are randomly sampled[58]. Form each of the clusters, 18 addresses are selected using systematic random sampling. For the Northern Ireland component, unclustered systematic simple random sampling of 2,395 residential address drawn from the Land and Property Services Agency in Northern Ireland is adopted which suggests that every individual has an equal chance of selection in Northern Ireland. The stratified sampling and the representation of the sample across all UK geographical regions, social classes and population densities make this dataset essential for the nature of the empirical work in this chapter. One limitation, however is that clustering at the PSU level may be less precise in estimates and thus less precise than simple random sampling of the same size. Furthermore, combining the Northern Ireland component and the UK component of data may make selection probability of this sample approximately twice that of the UK[59].

Another limitation associated with using the UKLS data is linked to the sample design of the Immigration Ethnic and Minority Boost (IEMB) component. This boost was collected to increase the representation of immigrants and ethnic minorities and in order to achieve this, 2,500 adult interviews were administered by the Understanding Society to five key target ethnic minority groups in identified areas of high concentration of ethnic minorities[60]. However, upon selection of a particular area, simple

[58] The random selection of clusters has been done to reduce cost of the survey, but it also creates sample bias, as some individuals have no chances of participation.
[59] This higher probability has the potential to bias UK wide estimates towards Norther Ireland.
[60] This selection is not random, hence bias is increased

random sampling is conducted hence every individual has a 100% chance of selection within a given area which reduces selection bias at a micro level.

As shown in Table 5.1, a total of 273,460 individual private housing tenure choices are recorded from waves 1 to 7. This large sample size is thus suitable for examining the research questions and other range of other related topics. The dataset is also suitable for the current study because of the variety of individual, household, socio-economic, demographic and locational factors it captures, as well as its longitudinal form which allows for cross-sectional analysis, time series analysis and longitudinal study, thus offering cross sectional perspectives, while accounting for variation over time.

5.3.2 List of variables and description

As discussed in the section 2, models of the housing tenure choices and transition typically test for the effects of several factors which are often classified as demographic (age, race, gender, marital status, ethnicity), household (household size, number of children, number of dependent children), socio-economic (educational qualification, income, debt level, employment status, type of job, savings), housing and locational (number of bedrooms, type of property, neighbourhood, distance to place of work, UK region of location), and sociocultural factors (religion, English proficiency, beliefs and culture). Table 1 provides the definition, summary statistics and transformation of the variables that are used in the empirical investigation.

Table 5.1: Summary Statistics

Variable	Variable name	Variable Description	N	Mean	SD
Homeownership	Homeownership	Binary variable 1=Homeownership; 0=rental (indicating if the individual owns or rents)	273460	0.847	0.360
Age	Age	Continuous variable: indicating the age of the individual	333739	47.125	18.557
	Age below 25 years	Binary variable: 1=if individual is below 25 years; 0=otherwise	333739	0.139	0.346
	25-34 years	Binary variable: 1=if individual is 25-34 years; 0=otherwise	333739	0.148	0.355
	35-44 years	Binary variable: 1=if individual is 35-44 years; 0=otherwise	333739	0.179	0.383
	45-54 years	Binary variable: 1=if individual is 45-54 years; 0=otherwise	333739	0.180	0.384
	55-64 years	Binary variable: 1=if individual is 55-64 years; 0=otherwise	333739	0.150	0.357
	Over 65 years	Binary variable: 1=if individual is over 65 years; 0=otherwise	333739	0.204	0.403
	Lifecycle (calibrated)	Categorical variable: 1= below 25years; 2=25-34 years; 3=35-44 years; 4=45-54 years; 5=55-64 years; 6= over 65 years	333739	3.667	1.696
Migration Lifecycle	Migrated less than 10 years ago	Binary variable: 1=if individual migrated less than 10 years ago; 0=otherwise	51131	0.264	0.441
	10-19 years ago	Binary variable: 1=if individual migrated 10-19 years ago; 0=otherwise	51131	0.257	0.438
	20-29 years ago	Binary variable: 1=if individual migrated 20-29 years ago; 0=otherwise	51131	0.143	0.350
	30-39 years ago	Binary variable: 1=if individual migrated 30-39 years ago; 0=otherwise	51131	0.114	0.318
	40-49 years ago	Binary variable: 1=if individual migrated 40-49 years ago; 0=otherwise	51131	0.123	0.328
	50-59 years ago	Binary variable: 1=if individual migrated 50-59 years ago; 0=otherwise	51131	0.074	0.261
	Over 60 years ago	Binary variable: 1=if individual migrated over 60 years ago; 0=otherwise	51131	0.026	0.441

	Migration Lifecycle (calibrated)	Categorical variable: 1=less than 10 years ago; 2=10-19 years ago; 3=20-29 years; 4=30-39 years; 5=40-49 years; 6= 50-59; 7= over 60 years ago	51131	2.898	1.1.726
Highest Educational Qualification	No qualification	Binary variable: 1=if individual has no qualification; 0=otherwise	329611	0.144	0.351
	A-level	Binary variable: 1=if highest qualification is A-level; 0=otherwise	329611	0.210	0.407
	GCSE	Binary variable: 1=if highest qualification is GCSE; 0=otherwise	329611	0.209	0.407
	Other higher degree	Binary variable: 1=if highest qualification is other degree; 0=otherwise	329611	0.113	0.317
	Other qualification	Binary variable: 1=if highest qualification is other qualification; 0=otherwise	329611	0.096	0.294
	Degree	Binary variable: 1=if highest qualification is first degree; 0=otherwise	329611	0.228	0.420
Gender	Male	Binary variable: 1=if individual is male; 0=female	333770	0.460	0.498
Disabled	Disabled	Binary variable: 1=if individual has a disability; 0=otherwise	334403	0.341	0.474
Household size	Single individual household	Binary variable: 1=if household has a single family member; 0=otherwise	333773	0.141	0.348
	Two individuals in the household	Binary variable: 1=if household has two family members; 0=otherwise	333773	0.337	0.473
	Three or more individuals in the household	Binary variable: 1=if household has three or more family members; 0=otherwise	333773	0.522	0.500
Living with spouse	Living with spouse	Binary variable: 1=if individual is living with spouse; 0=otherwise	333773	0.509	0.500
Household income	Household income (standardised OECD equivalised)	Household income variable is converted using OECD scale[61]. The new variable is further rescaled (standardised)	333343	1.330	1.000
Subjective financial wellbeing	Living comfortably	Binary variable: 1=if individual is living comfortably; 0=otherwise	308982	0.290	0.454
	Doing alright	Binary variable: 1=if individual is doing alright; 0=otherwise	308982	0.350	0.477
	Getting by	Binary variable: 1=if individual is getting by; 0=otherwise	308982	0.253	0.435

[61] See chapter four for the details of the equivalised household income scaling methodology.

	Quite difficult	Binary variable: 1=if individual is finding life quite difficult; 0=otherwise	308982	0.073	0.260
	Very difficult	Binary variable: 1=if individual is finding life very difficult; 0=otherwise	308982	0.033	0.178
Change in accommodation	Expecting to change accommodation soon	Binary variable: 1=if individual is planning to change accommodation soon; 0=otherwise	304628	0.126	0.331
Employment status	Employed	Binary variable: 1=if individual is employed; 0=otherwise	333664	1.456	0.498
	Unemployed	Binary variable: 1=if individual is unemployed; 0=otherwise		1.947	0.224
	Retired	Binary variable: 1=if individual is retired; 0=otherwise		1.776	0.417
	Others	Binary variable: 1=if individual's employment is not classified; 0=otherwise		1.821	0.384
Regional location in Britain	North East	Binary variable: 1=if individual is resident in the North-east; 0=otherwise	333519	0.037	0.188
	North West	Binary variable: 1=if individual is resident in the North-west; 0=otherwise	333519	0.100	0.299
	Yorkshire	Binary variable: 1=if individual is resident in Yorkshire; 0=otherwise	333519	0.082	0.274
	East midlands	Binary variable: 1=if individual is resident in the East Midlands; 0=otherwise	333519	0.074	0.261
	West midlands	Binary variable: 1=if individual is resident in the West Midlands; 0=otherwise	333519	0.082	0.274
	East England	Binary variable: 1=if individual is resident in East England; 0=otherwise	333519	0.084	0.277
	South-east England	Binary variable: 1=if individual is resident in South East England; 0=otherwise	333519	0.117	0.321
	South-west England	Binary variable: 1=if individual is resident in South-west England; 0=otherwise	333519	0.077	0.266
	Wales	Binary variable: 1=if individual is resident in Wales; 0=otherwise	333519	0.069	0.253
	Scotland	Binary variable: 1=if individual is resident in Scotland; 0=otherwise	333519	0.084	0.277
	Northern Ireland	Binary variable: 1=if individual is resident in Northern Ireland; 0=otherwise	333519	0.062	0.242

5.3.3 Methodology

The outcome variable in this study takes a binary form requiring a probability estimator which can be modelled as the conditional probability of housing tenure choice (conditional on a set of vectors of unobserved characteristics "***x***" of "homeownership" *y=1. P(y=1|**x**)*. Based on the assumption that *E(u|**x**)=0*, the zero conditional mean assumption holds,

$$P(y=1|\, x) = E(y|\mathbf{x}) \tag{5.1}$$

The logit and probit models constrain values between 1 and 0 and the functions are non-linear, requiring maximum likelihood estimation, since the effect of *x*, will be non-linear. According to Train (2009), Dynamic Causal Modelling (DCM) must have finite number of alternatives, be exhaustive and mutually exclusive; and the models adopted are defined in terms of latent variable hence a latent variable approach:

$$y_i^* = \mathbf{x}_i'\boldsymbol{\beta} + e_i \tag{5.2}$$

y_i^* is an unobserved latent variable thus it enables an observation of whether individuals are homeowners or not (y_i) which represents housing tenure. The values of "1" in homeownership and "0" in rented housing are determined by whether the outcome variable (y_i^*) crosses a threshold or not (threshold typically normalised to 0), negative values or "0" values of the latent variable would result in the observed variable y_i being equal to "0", while positive values are equal to "1" ($y_i = 0$ *if* $y_i^* \leq 0$ *and* $y_i = 1$ *if* $y_i^* > 0$*)*. This implies that a little change in some of the observed characteristics (*x*) and hence change in the latent variable may induce an individual to transit from rental to homeownership, while causing others to maintain their choice. e_i captures the errors which are assumed to be independent of x_i and symmetrically distributed around "0". When two individuals have the same observed characteristics (*x*), but different choices (y_i) the difference will be determined by the error

(e_i) which is determined by the crossing of the threshold or not. Furthermore, cumulative distribution of the error term (e_i) typically follows a normal or logistic distribution hence assuming an appropriate function for the errors can derive the probit and logit models.

This study employs the probit model estimator to test the hypotheses. This model is estimated through maximum likelihood estimation (MLE) and this estimator has been discussed and illustrated in chapters three and four. The likelihood function used in the previous chapters is maintained

$$\ln L(\boldsymbol{\beta} \mid \mathbf{x}_i) = \sum_{i=1}^{n} \left[(1 - y_i).\ln[1 - \Phi(\mathbf{x}_i'\boldsymbol{\beta})] + y_i.\ln \Phi(\mathbf{x}_i'\boldsymbol{\beta}) \right] \tag{5.3}$$

The marginal effects refer to the impact the explanatory variables have on the probability of being in homeownership relative to rental housing and since the estimation is non-linear and this also takes the form used in chapters three and four

$$\frac{\partial p(\boldsymbol{\mu}_{\mathbf{x}})}{\partial x_j} = \hat{\beta}_j g(\bar{\mathbf{x}}\hat{\boldsymbol{\beta}}) \tag{5.4}$$

In setting out the model, various sources of bias which may negatively affect the modelling and results are anticipated and addressed. A key issue is heteroscedasticity and non-normality in the error term. Heteroskedasticity is the possibility that the size of error term (u_i) differs across values of a predictor variable (x_i). It may also be referred to as the circumstances in which the variability of a variable is unequal across the range of values of another variable that predicts it. It means that the variance of the error term of the predictor variables (x_i) is a function of x_i *{Var* ($e_i|x_i$)*= f*(x_i)*}*. There are usually concerns about the non-normality of the errors (e) in the latent variable which may suggest that the probability would not have a probit form and the estimated coefficient may be inconsistent. Wooldridge (2013) however argues that even consistent estimates of the coefficients may not capture the magnitude of the marginal effects. Given that the probabilities are conditional on the x variables, it is highly likely that

the unobserved latent variable will be heteroskedastic. Thus, the "robust" option is applied in the model to account for heteroskedasticity. However, while the robust option may correct heteroskedasticity in OLS regression, it may not adjust for heteroskedasticity in the latent model and this may lead to inconsistent estimates. Despite heteroskedasticity being common in cross-sectional data, it is an issue that is usually ignored (partly due to the fact that latent variables are never observed).

The estimation equations are specified as follows:

General Population:

$$Pr(Ownrent) = 1|X_1 X_2 \ldots X_{14}) = \beta_0 + \beta_1 age + \beta_2 household\ size + \beta_3 marital\ status + \beta_4 gender + \beta_5 educational\ qualification + \beta_6 employment\ status + \beta_7 regional\ location + \beta_8 race + \beta_9 urban\ dwelling + \beta_{10} disability + \beta_{11} living\ with\ spouse + \beta_{12} subjective\ financial\ well\text{-}being + \beta_{13} expectation\ to\ change\ accommodation + \beta_{14} wave \quad (5.5)$$

First-generation migrants:

$$Pr(Ownrent) = 1|X_1 X_2 \ldots X_{15}) = \beta_0 + \beta_1 age + \underline{\beta_2 migration\ lifecycle} + \beta_3 household\ size + \beta_4 marital\ status + \beta_5 gender + \beta_6 educational\ qualification + \beta_7 employment\ status + \beta_8 regional\ location + \beta_9 race + \beta_{10} urban\ dwelling + \beta_{11} disability + \beta_{12} living\ with\ spouse + \beta_{13} subjective\ financial\ well\text{-}being + \beta_{14} expectation\ to\ change\ accommodation + \beta_{15} wave \quad (5.6)$$

5.4 Results and Analysis

It is important to begin by observing the effects of the attributes of natives and non-natives which are associated with homeownership prospects. To consider this, the migration generational effects are observed first by region and this is followed by income class.

For the regional patters, the baseline model is developed based on the eqn (5.5) and this specification is estimated in subsets of the regional locations based on the 12 regions in Britain. The key independent variable is a categorical variable that captures the traditional immigration generations. The hold-out category is "natives", thus the potential effects of being a second-generation or first-generation migrant (relative to natives) on homeownership prospects can be observed. The regional classification is important because previous research (Drake 1995; Koblyakova et al. 2014) provide some evidence of regional variations in segments of the UK housing market. Additionally, studies (such as Muller and Espenhade, 1985; Ley and Tuchener, 1999; and Saiz, 2003 and 2007) suggest that the housing markets in migrant gateway and destination cities may be distinct, thus this regional analysis facilitates an exploration of the uniqueness of London, which according to Gidley (2011), is the main UK immigrant gateway and destination city.

Table 5.2: Housing Tenure Outcomes: regional patterns

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	VARIABLES	Baseline Model	London	Northeast	Northwest	Yorkshire	East Midlands	West Midlands	East England	South East	South West	Wales	Scotland	N Ireland
Migration generations	Natives	-	-	-	-	-	-	-	-	-	-	-	-	-
	Second-generation	0.006	0.047***	-0.050	0.004	-0.009	0.000	-0.001	0.009	0.004	-0.015	-0.007	0.003	0.007
	First-generation	-0.114***	-0.204***	-0.048	-0.066***	-0.092***	-0.102***	-0.111***	-0.108***	-0.092***	-0.056***	-0.039*	-0.081***	-0.090***
Age	Age below 25 years	-	-	-	-	-	-	-	-	-	-	-	-	-
	25-34 years	-0.031***	-0.074***	-0.037*	-0.026**	0.005	-0.027**	-0.015	-0.048***	-0.049***	-0.014	-0.032**	-0.002	-0.037**
	35-44 years	0.044***	0.093***	0.004	0.032***	0.074***	0.061***	0.040***	0.015	0.015	0.087***	0.029*	0.036***	0.024
	45-54 years	0.110***	0.221***	0.083***	0.101***	0.122***	0.121***	0.101***	0.085***	0.071***	0.149***	0.108***	0.064***	0.059***
	55-64 years	0.156***	0.330***	0.122***	0.127***	0.179***	0.131***	0.158***	0.110***	0.122***	0.207***	0.134***	0.102***	0.104***
	Over 65 years	0.176***	0.360***	0.105***	0.158***	0.128***	0.156***	0.208***	0.148***	0.155***	0.213***	0.151***	0.115***	0.148***
Educational Qualification	Degree	-	-	-	-	-	-	-	-	-	-	-	-	-
	No qualification	-0.039***	-0.084***	-0.061**	-0.061***	-0.033**	-0.041**	-0.020	-0.035**	-0.071***	-0.001	-0.059***	-0.031**	-0.037**
	A-level	0.001	0.026*	-0.018	-0.017	0.013	-0.036***	0.016	0.012	-0.009	0.015	-0.030**	-0.010	-0.005
	GCSE	-0.014***	-0.012	-0.038*	-0.033***	0.003	-0.027*	0.001	-0.029**	-0.017	-0.005	-0.036**	-0.028**	0.002
	Other higher degree	-0.004	-0.028	0.027	-0.021	0.005	0.005	0.001	-0.016	-0.003	0.006	-0.043**	-0.014	0.005
	Other qualification	-0.031***	-0.054**	-0.083***	-0.042***	-0.002	-0.052***	-0.007	-0.032*	-0.027*	-0.006	-0.045**	-0.034**	-0.036**
Gender	Male	-0.011***	-0.032***	-0.004	-0.004	-0.008	-0.002	-0.009	-0.014*	-0.018**	-0.017*	-0.001	-0.008	0.010
Race	White	-	-	-	-	-	-	-	-	-	-	-	-	-
	Black	-0.007	0.030*	-0.226***	-0.106***	0.007	-0.000	0.044**	-0.025	-0.033	0.038	-0.072	-0.018	
	Asian	0.045***	0.069***	-0.008	0.049***	0.123***	0.053**	0.085***	0.042**	0.023	0.031	-0.008	-0.010	-0.183***
	Arab/ Middle East	-0.031*	0.029		-0.043	-0.054	0.069	-0.044	-0.035	0.024	-0.141		-0.088	
	Mixed Race	-0.014	0.058**	0.074	-0.040	-0.048	0.019	-0.046*	-0.064**	-0.012	-0.040	0.032	-0.020	0.020
	Other race	-0.000	0.022	0.069	0.047	0.097*	-0.028	-0.163**	-0.004	0.101**		-0.121*	-0.020	
Urban dweller	Urban dweller	0.012***	-0.071	0.015	0.013	0.015	0.019*	0.050***	0.007	0.010	0.035***	0.023**	0.025***	-0.014
Disabled	Disabled	-0.010***	0.011	-0.005	-0.009	0.001	-0.001	-0.019**	-0.007	-0.007	-0.027***	-0.014*	-0.017***	-0.023***
Household size	Single individual household	-	-	-	-	-	-	-	-	-	-	-	-	-
	Two individuals in the household	0.020***	0.041**	-0.037*	0.014	0.014	0.041***	0.000	0.005	0.018	0.034**	-0.002	0.021**	0.030**

	Three or more individuals in the household	0.099***	0.169***	0.054**	0.083***	0.075***	0.097***	0.080***	0.085***	0.094***	0.120***	0.058***	0.085***	0.101***
Living with spouse	Living with spouse	0.053***	0.067***	0.086***	0.073***	0.053***	0.042***	0.039***	0.062***	0.051***	0.031***	0.060***	0.030***	0.038***
Household income	Household income	0.024***	0.028***	0.045***	0.023***	0.047***	0.035***	0.029***	0.030***	0.021***	0.037***	0.015**	0.026***	0.022***
Subjective financial wellbeing	Living comfortably	-	-	-	-	-	-	-	-	-	-	-	-	-
	Doing alright	-0.031***	-0.049***	-0.027**	-0.034***	-0.033***	-0.029***	-0.026***	-0.023***	-0.031***	-0.045***	-0.026***	-0.013**	-0.024***
	Getting by	-0.068***	-0.089***	-0.069***	-0.062***	-0.079***	-0.050***	-0.057***	-0.062***	-0.074***	-0.097***	-0.051***	-0.038***	-0.041***
	Quite difficult	-0.087***	-0.160***	-0.071***	-0.092***	-0.093***	-0.088***	-0.065***	-0.079***	-0.081***	-0.100***	-0.049***	-0.040***	-0.063***
	Very difficult	-0.108***	-0.194***	-0.050*	-0.111***	-0.098***	-0.067***	-0.099***	-0.097***	-0.124***	-0.137***	-0.101***	-0.076***	-0.047**
Expecting to change accommodation	Expecting to change accommodation	-0.108***	-0.170***	-0.107***	-0.083***	-0.101***	-0.100***	-0.100***	-0.100***	-0.112***	-0.106***	-0.064***	-0.077***	-0.076***
Employment status	Employed	-	-	-	-	-	-	-	-	-	-	-	-	-
	Unemployed	-0.031***	-0.016	-0.103***	-0.049***	-0.021	-0.001	-0.020	-0.034*	-0.015	0.009	-0.043**	-0.065***	-0.075***
	Retired	0.038***	0.076***	0.044**	0.030**	0.041**	0.068***	0.031*	0.033**	0.054***	0.041***	0.010	0.035***	-0.004
	Others	-0.049***	-0.033**	-0.100***	-0.047***	-0.057***	-0.029**	-0.046***	-0.022*	-0.056***	-0.056***	-0.055***	-0.076***	-0.054***
Pseudo r^2		0.221	0.277	0.226	0.214	0.212	0.216	0.216	0.222	0.240	0.233	0.178	0.241	0.205
Observations		220,906	24,640	7,984	22,716	18,168	16,940	18,633	19,488	27,727	18,227	14,555	17,912	13,823

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results in Table 5.2 show that first-generation immigrants have lower homeownership prospects in all British regions, and these effects are statistically significant across the regions apart from North-east England, thus confirming the proposition that being a first-generation immigrant negatively affects homeownership prospects in the UK and across the UK regions. The prospects of homeownership for the second-generation migrants (relative to natives) is however mixed, though statistically insignificant in the general UK population and across UK regions, apart from London where the second-generation migrants appear to have higher homeownership prospects than natives and this is statistically significant.

The results also show that London is unique in several ways: first, the effects for the second-generation migrants is only statistically significant in London (compared to the other UK regions where no statistically significant effects are observed); second, the first-generational effect, though statistically significant in majority of the regions, has a more robust effect in London; and third, the model fit for London appears to be the strongest among all regions. These provide empirical support to the assertion that the housing pattern in London is indeed unique and this can be a subject for further study. Furthermore, the higher magnitude of the negative effect of being a first-generation migrant may also be an indication of affordability constraints for first generation immigrants, which is more severe in London.

To observe a possible variation across income categories, the analysis carried out at regional level is re-estimated by income class. The baseline model adopts the same specification used in Table 5.2 and six income-group-based models are also developed. A simple categorisation of income classes is developed based on the basic[62] and higher rate[63] levels of the UK annual taxable income bands (£11,850 to £150,000 annual income). Specifically, Group 1 is categorized as households with a net monthly income between £1,000 and £2,000, Group 2 as households who earn £2,001 to £3,000, and

[62] Earning an annual income between £11,850 and £46,350
[63] Earning an annual income between £46,351 and £150,000

Group 3 as households earning between £3,001 and £4,000. Furthermore, households earning between £4,001 and £5,000 are classified in Group 4, while households earning between £5,001 and £6,000, and £6,000 to £12,500 are classified as Group 5 and Group 6 respectively. This provides insight on the variation of the housing tenure outcomes of natives and non-native generations regardless of if they are in similar economic classes.

The results of the variation by economic classes is shown in Table 5.3, and the results reveal that first-generation immigrants have significantly lower homeownership prospects compared natives in the same income group. It can be further observed that these effects are of higher magnitude in the lower income categories (particularly Groups 1, 2 and 3) suggesting that an upward transition in income class may address the homeownership gap between first-generation immigrants and natives. It can also be observed that second-generation immigrants have higher homeownership prospects in most income classes (with the exception in Groups 4 and 5). These effects are however not statistically significant in most of the income classes in relation to natives, suggesting that there are generally no differences between second-generation immigrants and natives in the same income classes in terms of their housing tenure outcomes.

Table 5.3: Housing Tenure Outcomes: household income class

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VARIABLES	**Baseline Model**	**Group 1**	**Group 2**	**Group 3**	**Group 4**	**Group 5**	**Group 6**
Migrants generations	Natives	-	-	-	-			
	Second Generation	0.008	0.027**	0.003	0.000	-0.003	-0.003	0.004
	First Generation	-0.114***	-0.134***	-0.149***	-0.100***	-0.073***	-0.080***	-0.068***
Age	Age below 25 years	-	-	-	-			
	25-34 years	-0.029***	0.006	-0.020***	-0.050***	-0.041***	-0.046***	-0.048***
	35-44 years	0.047***	0.137***	0.063***	0.003	-0.009	-0.003	-0.016*
	45-54 years	0.115***	0.242***	0.144***	0.043***	0.019**	0.026***	0.011
	55-64 years	0.162***	0.302***	0.196***	0.074***	0.046***	0.032***	0.019*
	Over 65 years	0.183***	0.334***	0.209***	0.081***	0.065***	0.057***	0.027*
Educational Qualification	Degree	-	-	-	-			
	No qualification	-0.052***	-0.045***	-0.039***	-0.032***	-0.036***	-0.041***	0.003
	A-level	-0.006*	0.009	0.009	0.004	-0.006	0.015**	0.005
	GCSE	-0.023***	-0.012	-0.002	-0.013**	-0.012**	-0.009	-0.005
	Other higher degree	-0.009**	0.008	-0.002	-0.004	-0.001	-0.009	0.017**
	Other qualification	-0.042***	-0.024**	-0.036***	-0.030***	-0.034***	-0.027***	-0.027***

Gender	Male	-0.010***	-0.014**	-0.006	-0.008**	-0.008**	-0.007	-0.007
Race	White	-	-	-	-			
	Black	-0.008	0.001	-0.005	-0.014	-0.026***	0.005	-0.012
	Asian	0.040***	0.108***	0.055***	0.018**	0.015**	0.024***	-0.003
	Arab/ Middle East	-0.037**	-0.007	-0.030	-0.055*	-0.030	-0.020	-0.012
	Mixed Race	-0.013	-0.022	0.000	-0.039***	-0.024*	0.002	-0.007
	Other race	-0.003	-0.032	-0.008	0.010	0.004	-0.001	-0.005
Urban dweller	Urban dweller	0.011***	0.037***	0.009	-0.001	0.007	0.010	0.007
Disabled	Disabled	-0.010***	-0.014***	-0.018***	-0.010**	-0.007*	-0.007	0.000
Household size	Single individual household	-	-	-	-			
	Two individuals in the household	0.026***	0.015*	-0.032***	-0.028**	0.001	0.026	-0.008
	Three or more individuals in the household	0.102***	0.069***	0.040***	0.018	0.030**	0.045**	0.018
Living with spouse	Living with spouse	0.053***	0.072***	0.064***	0.061***	0.041***	0.045***	0.027***
Subjective financial wellbeing	Living comfortably	-	-	-	-			
	Doing alright	-0.040***	-0.057***	-0.031***	-0.021***	-0.014***	-0.009*	-0.015***
	Getting by	-0.081***	-0.106***	-0.068***	-0.046***	-0.038***	-0.018***	-0.026***
	Quite difficult	-0.102***	-0.127***	-0.093***	-0.057***	-0.043***	-0.033***	-0.043***
	Very difficult	-0.125***	-0.169***	-0.109***	-0.085***	-0.046***	-0.010	-0.057***
Expecting to change accommodation	Expecting to change accommodation	-0.108***	-0.129***	-0.132***	-0.100***	-0.074***	-0.074***	-0.060***
Employment status	Employed	-	-	-	-			
	Unemployed	-0.042***	-0.050***	-0.016	-0.006	0.006	0.022**	0.003
	Retired	0.031***	0.034***	0.053***	0.043***	0.007	0.006	0.024**
	Others	-0.057***	-0.059***	-0.034***	-0.026***	-0.023***	-0.011	-0.021***
Pseudo r2		0.217	0.261	0.205	0.185	0.153	0.152	0.189
Observations		221,120	50,591	55,770	42,097	25,479	13,364	15,143

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level.*

Having established these key variations, the study is expanded further to focus on the key research questions. Table 5.4 shows marginal effects for the baseline models. Column 1 shows the baseline specification with no control for location and time fixed effects, and in column 2, locational fixed effects (regions in the UK) are added to control for locational unobserved heterogeneity. In model 3, year dummies are introduced to account for time fixed effects and to control for any temporal

unobservable[64]. In column 4, both location and time fixed effects are introduced in the models. One of the key goals is to find results that are consistent across all four models i.e. an attempt to find consistency in the parameter estimates after controlling for unobserved heterogeneity. As evident from table 5.4, the results are robust to this concern, when compared across the columns. The goodness of fit is also reasonable, given the earlier point made on probit reporting lower goodness of fit in chapter three.

Table 5.4: Baseline Results (full sample) - marginal effects

		(1)	(2)	(3)	(4)
	VARIABLES	**Baseline Model**	**With Locational FE**	**With Time FE**	**With Locational and Time FE**
Age	Age below 25 years	-	-	-	-
	25-34 years	-0.054***	-0.053***	-0.054***	-0.053***
	35-44 years	0.021***	0.021***	0.021***	0.021***
	45-54 years	0.089***	0.089***	0.089***	0.089***
	55-64 years	0.134***	0.135***	0.134***	0.135***
	Over 65 years	0.154***	0.157***	0.155***	0.158***
Educational Qualification	Degree	-	-	-	-
	No qualification	-0.036***	-0.043***	-0.037***	-0.044***
	A-level	0.009***	0.005	0.009**	0.005
	GCSE	0.000	-0.004	0.000	-0.004
	Other higher degree	0.000	-0.004	0.000	-0.004
	Other qualification	-0.029***	-0.033***	-0.030***	-0.033***
Gender	Male	-0.008***	-0.008***	-0.008***	-0.008***
Race	White	-	-	-	-
	Black	-0.073***	-0.045***	-0.072***	-0.044***
	Asian	-0.021***	-0.005	-0.020***	-0.004
	Arab/ Middle East	-0.112***	-0.091***	-0.111***	-0.090***
	Mixed Race	-0.042***	-0.025***	-0.042***	-0.024***
	Other race	-0.070***	-0.049***	-0.070***	-0.049***
Urban dweller	Urban dweller	0.007**	0.014***	0.007**	0.015***
Disabled	Disabled	-0.009***	-0.010***	-0.009***	-0.010***
Household size	Single individual household	-	-	-	-
	Two individuals in the household	0.023***	0.023***	0.023***	0.023***

[64]All the key models (Tables 4-7) have time fixed effects (apart from the Models in Table 3 columns 1 and 2 where the waves vector is excluded as an experiment). By accounting for time-fixed effects based on the waves in which the data was collected, the longitudinal nature of the data is put in good use

	Three or more individuals in the household	0.106***	0.105***	0.106***	0.106***
Living with spouse	Living with spouse	0.046***	0.045***	0.046***	0.045***
Household income	Household income	0.026***	0.029***	0.027***	0.030***
Subjective financial wellbeing	Living comfortably	-	-	-	-
	Doing alright	-0.034***	-0.034***	-0.035***	-0.034***
	Getting by	-0.072***	-0.070***	-0.073***	-0.071***
	Quite difficult	-0.095***	-0.093***	-0.096***	-0.094***
	Very difficult	-0.118***	-0.114***	-0.119***	-0.116***
Expecting to change accommodation	Expecting to change accommodation	-0.112***	-0.110***	-0.113***	-0.110***
Employment status	Employed	-	-	-	-
	Unemployed	-0.033***	-0.032***	-0.033***	-0.032***
	Retired	0.043***	0.042***	0.043***	0.042***
	Others	-0.044***	-0.043***	-0.043***	-0.043***
Regional locations in Britain/Regional Fixed Effects	London	-	-	-	-
	North East	NO	0.043***	NO	0.044***
	North West	NO	0.061***	NO	0.061***
	Yorkshire	NO	0.061***	NO	0.061***
	East midlands	NO	0.056***	NO	0.057***
	West midlands	NO	0.064***	NO	0.064***
	East England	NO	0.049***	NO	0.049***
	South-east England	NO	0.039***	NO	0.039***
	South-west England	NO	0.036***	NO	0.036***
	Wales	NO	0.066***	NO	0.066***
	Scotland	NO	0.082***	NO	0.082***
	Northern Ireland	NO	0.075***	NO	0.075***
Waves/time fixed effects	2.wave	NO	NO	0.011***	0.009***
	3.wave	NO	NO	0.010***	0.007***
	4.wave	NO	NO	0.007***	0.004**
	5.wave	NO	NO	0.003	0.000
	6.wave	NO	NO	-0.006***	-0.009***
	7.wave	NO	NO	-0.008***	-0.011***
Constant		0.703***	0.385***	0.688***	0.381***
Observations		243,774	243,774	243,774	243,774
Pseudo r2		**0.198**	**0.204**	**0.199**	**0.204**

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level.*

The results in Table 5.4 show that advancing to a higher stage in the lifecycle increases homeownership prospects (consistent with the proposition made earlier). Similarly, being a male decreases the probability of homeownership by 0.008 (0.8%); while being from a household of two individuals

increase homeownership probability by 0.023 (2.3%), compared to a household with a single individual. Compared to the outcome for Whites, all other races tend to have negative feedback effect on homeownership rate, while living with spouse improves the probability of owning a home significantly.

In Table 5.5, the best specificaiton of table 5.4 (column 4) serves as the base model (column 1 table 5.5) in order to examine the hypothesis further by analysing natives, second generation and first generation immigrants separately. Several intersting findings emerge from Table 5.5.

Table 5.5: Baseline Models with Locational and Time-Fixed Effects for Natives, Second-generation and First-generation Migrants

		(1)	(2)	(3)	(4)
	VARIABLES	All observations	Natives	Second-generation	First-generation
Age	Age below 25 years	-	-	-	-
	25-34 years	-0.053***	-0.019***	-0.045***	-0.051***
	35-44 years	0.021***	0.045***	0.033**	0.085***
	45-54 years	0.089***	0.094***	0.105***	0.251***
	55-64 years	0.135***	0.132***	0.149***	0.353***
	Over 65 years	0.158***	0.150***	0.204***	0.385***
Educational Qualification	Degree	-	-	-	-
	No qualification	-0.044***	-0.056***	-0.043**	0.005
	A-level	0.005	-0.011***	-0.009	0.041***
	GCSE	-0.004	-0.024***	-0.022*	0.027
	Other higher degree	-0.004	-0.009*	-0.051***	0.027
	Other qualification	-0.033***	-0.027***	-0.052***	-0.070***
Gender	Male	-0.008***	-0.003	-0.009	-0.061***
Race	White	-	-	-	-
	Black	-0.044***	0.019	0.010	0.006
	Asian	-0.004	0.053**	0.074***	0.082***
	Arab/ Middle East	-0.090***		0.113**	-0.055
	Mixed Race	-0.024***	-0.031**	-0.010	0.036
	Other race	-0.049***	-0.072*	0.023	0.031
Urban dweller	Urban dweller	0.015***	0.021***	-0.006	-0.047**
Disabled	Disabled	-0.010***	-0.016***	0.000	0.034***
Household size	Single individual household	-	-	-	-
	Two individuals in the household	0.023***	0.016***	0.024*	0.019
	Three or more individuals in the household	0.106***	0.089***	0.125***	0.093***
Living with spouse	Living with spouse	0.045***	0.046***	0.030***	0.125***

Household income	Household income	0.030***	0.022***	0.017***	0.063***
Subjective financial wellbeing	Living comfortably	-	-	-	-
	Doing alright	-0.034***	-0.029***	-0.020***	-0.048***
	Getting by	-0.071***	-0.063***	-0.067***	-0.082***
	Quite difficult	-0.094***	-0.078***	-0.102***	-0.131***
	Very difficult	-0.116***	-0.107***	-0.103***	-0.143***
Expecting to change accommodation	Expecting to change accommodation	-0.110***	-0.080***	-0.111***	-0.241***
Employment status	Employed				
	Unemployed	-0.032***	-0.037***	-0.005	-0.039**
	Retired	0.042***	0.038***	0.016	0.049*
	Others	-0.043***	-0.052***	-0.058***	-0.041***
Regional locations in Britain/Regional Fixed Effects	London	-	-	-	-
	North East	0.044***	0.021**	-0.074**	0.129***
	North West	0.061***	0.031***	0.002	0.146***
	Yorkshire	0.061***	0.031***	0.013	0.161***
	East midlands	0.057***	0.034***	0.008	0.096***
	West midlands	0.064***	0.034***	0.019	0.119***
	East England	0.049***	0.034***	0.009	0.062***
	South-east England	0.039***	0.022***	-0.005	0.057***
	South-west England	0.036***	0.015**	-0.025	0.113***
	Wales	0.066***	0.039***	-0.001	0.125***
	Scotland	0.082***	0.056***	0.039*	0.083***
	Northern Ireland	0.075***	0.057***	0.032	0.012
Waves/Time Fixed Effects	Wave 1	-	-	-	-
	Wave 2	0.009***	-0.001	0.001	0.030***
	Wave 3	0.007***	-0.008***	0.000	0.041***
	Wave 4	0.004**	-0.014***	-0.001	0.046***
	Wave 5	0.000	-0.019***	-0.011*	0.051***
	Wave 6	-0.009***	-0.029***	-0.020***	0.040***
	Wave 7	-0.011***	-0.032***	-0.026***	0.028***
Observations		243,774	165,788	22,715	32,402
Pseudo r2		**0.204**	**0.205**	**0.189**	**0.263**

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level.*

The results in table 5.5 appear to be consistent with the lifecycle theory- homeownership prospect increases for natives, first-generation and second-generation migrants with the transition into the next age group. Furthermore, the magnitude of the effect of the factors tested are generally higher for the second-generation migrants (compared to those of natives). These also appear to be much higher for the first-generation migrants compared to natives; and first-generation compared to second-generation migrants. While the lifecyle effect for natives (column 2) and second-generation mgirants (column 3) are similar to the full sample model (column 1), there are much higher magnitudes of influence for

first-generation migrants. The variations observed underscore the importance of a heterogeneous modelling approach, particularly when first-generation migrants are included, in housing tenure models. Models that do not control for the migration generational heterogeneity may be misleading, particulalry with regards to first-generation migrants.

The effects of the key factors on second-generation migrants appear to be similar to natives, than to first-generation, implying that second-generation migrants in Britain are more similar to natives than to their parents which may indicate less barriers to assimilation. This appears to be different from the literature (such as Keeley, 2009) which find that assimilation is slower for second-generation migrants in terms of education. In terms of gender, women are slightly more likely to own than rent – and this effect appear to be stronger for first generaiton migrants (significant in full-sample model, but insignificant for natives and second-generation migrants). The higher probability of women to be in homeowernship compared to renting for natives, first-generation and seocnd generation migrants is consistent with the findings of Åslund (2005).

In Table 5.6, the lifecycle effect on housing tenure outcomes is further examined with a focus on first-generation migrants. The effect of the migration lifecycle is specifically examined in Table 5.6 column 2 and the results are compared to those obtained in Table 5.5 column 4[65].

Table 5.6: Lifecycle Effects across Models (First-generation only)

	(1)	(2)
VARIABLES	**Lifecycle Effects only**	**Migration Lifecycle**
Lifecycle (Age)	0.113***	0.030***
Migration Lifecycle	NO	0.124***
Educational Qualification	YES	YES
Gender	YES	YES
Race	YES	YES
Urban dweller	YES	YES
Disabled	YES	YES
Household size	YES	YES
Living with spouse	YES	YES
Household income	YES	YES

[65] Table 5.6 column 1 is a direct replication of Table 5.5 column 4, however the hitherto binary variable for age has been and now takes the form of a categorical variable, and the same is implemented for the migration lifecycle in order to have more unified basis of comparison.

Subjective financial wellbeing	YES	YES
Expecting to change accommodation	YES	YES
Employment status	YES	YES
Regional locations in Britain/Regional Fixed Effects	YES	YES
Waves/Time Fixed Effects	YES	YES
Observations	32,402	32,402
Pseudo r2	**0.2553**	**0.328**

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level.*

The results in table 5.6 reveal that immigrants' homeownership prospects increase with the number of years they have spent in the destination country and this is statistically significant. It is also noteworthy that the migration lifecycle effect is much stronger than the natural lifecycle effect, suggesting that the number of years spent in the destination country may be a stronger predictor of the housing outcomes of first-generation migrants compard to age. This is supported by the significant increase in the model's fit (Psuedo r^2) when the migration lifecyle control is introduced. Furthermore, it can be observed that the age effect decreases significantly after the incorporation of the migration lifecycle, further supporting the proposition that the lifecycle effects may be an insufficient basis for modelling the housing outcomes for the first-generation migrants.

In Table 5.7, the same model specifications used in Table 5.6 is adopted, however the natural lifecycle and migration lifecycle variables are callibrated in 10-yearly intervals in order to further observe the actual "lifecycle" effects. The results in Table 5.7 column 2 suggest that a 10-year increase in number of years spent in the destination country has very significant effects on the immigrants' homeowership prospects. It further suggests that the most significant prospects of homeownership are in the first three stages of the migration lifecycle and these effects drastically reduce as immigrants advance in their migration lifecourse.

Table 5.7: Migration Lifecycle Effects across Models (Calibrated variables)

		(1)	(2)
	VARIABLES	**Lifecycle effects only**	**Migration Lifecycle**
Lifecycle (Age)	Below 25 years	-	-
	25-34 years	-0.084***	-0.019***
	35-44 years	-0.041**	0.045***
	45-54 years	0.030	0.094***
	55-64 years	0.053**	0.132***
	Over 65 years	0.051	0.150***
Migration Lifecycle	Less than 10 years	NO	-
	10-19 years	NO	0.223***
	20-29 years	NO	0.368***
	30-39 years	NO	0.453***
	40-49 years	NO	0.494***
	50-59 years	NO	0.512***
	Over 60 years	NO	0.519***
Educational Qualification		YES	YES
Gender		YES	YES
Race		YES	YES
Urban dweller		YES	YES
Disabled		YES	YES
Household size		YES	YES
Living with spouse		YES	YES
Household income		YES	YES
Subjective financial wellbeing		YES	YES
Expecting to change accommodation		YES	YES
Employment status		YES	YES
Regional locations in Britain/Regional Fixed Effects		YES	YES
Waves/Time Fixed Effects		YES	YES
Observations		32,402	32,402
Pseudo r2		**0.263**	**0.341**

Note: Standard errors in parentheses; *** p<0.01, **; p<0.05, * p<0.1. *All standard errors are clustered at individual level.*

5.5 Summary and Concluding Remarks

Migration has perhaps been the most consistent long-run trend, which has clearly intensified in recent years. The drivers and determinants of migration both in the destination and origin country differ significantly. One of the key areas of policy analysis is housing outcome, which is linked to employment outcome. This chapter examines the variation in the housing tenure patterns of natives and non-native generations using a longitudinal survey data in Britain. This data enables an observation of multiple generation of immigrants, their migration-related information, as well as other economic,

demographic, locational and socio-cultural charactersitics.

In terms of the housing context, instead of focusing solely on migrants, the study analysed the outcomes with comparison to the native counterparts. This has enabled a showcase of the varying nature of housing tenure outcomes for natives and non-natives. This is important to study as one of the most politically contentious and recent rhetoric is around the frequently claimed effect of immigration having detrimental effects on the already broken housing market with burgeoning demand in the face to lack of supply and worsening housing affordability. The empirical evidence is not strong and not backed by rigorous methods. The anecdotal nature of the debate is unhelpful for any meaningful and objective policy formulation and often can lead to nationalistic movements and sentiments that go against all the great outcomes of a globalised world. For targeted policy-making that may help with the housing outcomes for both native and migrant groups, it is important to understand the real effects of migration. This study, with its limitations, shades light on this important policy area.

Using probability models for housing tenure, the results reveal significant variations in the housing tenure outcomes of natives, second generation and first generation immigrants, and these results are robust to several econometric specifications. The results particulalry show that first generation immigrants generally have different housing tenure outcomes from natives and second generation migrants. The second-generation migrants however appear to be have more similar housing tenure patterns to natives than to the first-generation migrants (their parents).

The results further show that the key factors which influence the housing tenure outcomes of individuals have varying degrees of impact on natives and immigrants. For the ecucational qualificaiton, varying effects are observed for first-generation migrants compared to second-generation and natives. Specifically, having a degree increases homeownership prospects for natives and second-generation, while it has adverse effects on first-generation migrants. For race/ethnicity, while the white race increases homeownership prospects for the general population, models controlling

for specific sample show variations by migrant cohort - race is a stronger predictor for natives than for second-generation and least of a factor for first-generation migrants.

Further variations can also be observed: for instance, being an urban dweller decreases homeownership prospects for second and first-generation migrants. This may be an indication of affordability in most UK urban areas which may be linked with high property prices. Mobility (the expectation to change acommodation soon) plays a stronger role for the first-generation migrants than for the second-generation non-natives and natives. In addition to these, locational factors also have varying effects. The results show that living in London decreases homeowership prospects for the first-generation non-natives and natives, but being in the regions of North East, South East, South West and Wales decreases homeownership prospects for the second-generation migrants compared to living in London.

Another area which this study examines relates to the application of the natural lifecycle and the migration lifecycle of first generation immigrants. The results reveal that immigrants' homeowernship prospects increase as they advance in their migration lifecyle (i.e. years spent in Britain). It is further observed that the migration lifecycle may be a better predictor of housing tenure outcomes than the natural lifecycle (i.e. age) for the first-generation migrants.

This study also gives credence to the approach of modelling the housing tenure outcomes of heterogeneous societies (such as Britain) using heterogeneous models. The findings from this study can aslo usefully contribute to policy formulations in terms of creating more equitable housing pathways.

CHAPTER SIX

Summary, Conclusions and Discussion

6.0 Introduction

This PhD research was conceptualised from curiosity arising from debates surrounding global migration and the pathways of immigrants. The debate around Brexit (2016) is a key reference. The Brexit referendum was preceded by several campaigns and protests by politicians, civil society and pressure groups, and the almost even results (52% voted to leave the EU while 48% voted to remain in the EU) is an indication of the polarised ideas around migration[66]. It is interesting to note that three years after the Brexit referendum, there remains diverging perspectives on migration; and this divergence is usually along demographic lines (for instance, younger people voted to remain in the EU while older people voted to leave) and regional lines (for instance, regions in the North of the UK predominantly voted to remain in the EU while the South generally voted to leave). Another angle of curiosity relates to the variation in the housing conditions of immigrant generations and their native counterparts, particularly their housing tenure and residential locational choices. The quest to expand knowledge and understanding of some of these issues necessitated this research. This research has therefore focused on the migration phenomenon, global migration trends and patterns, the drivers of migration, migration policy and the links between migration and housing. Furthermore, the thesis examines the housing consumption pattern of immigrants when they arrive the destination country.

Because migration is a topical issue, this research was developed based on the preliminary review of both scholarly and non-scholarly literature. Scholarly review is important for developing the requisite theoretical constructs around migration and housing, while non-scholarly review offers insight on the contemporary issues which are associated with migration and housing. This preliminary review underpinned the formulation of the research aim, objectives and questions to be investigated in this

[66] The Migration Observatory, 2016a, 2016b reveal that migration was a contentious issue in the Brexit debates.

study. The review was followed by the definition of the research paradigm which guided the conduct of the research. The complexity of migration, the heterogeneity in the issues associated with the phenomenon, and the variation in the methods and approaches in previous migration-related studies necessitated the adoption of a combination of research method and designs for the different components of this study.

The thesis has been accomplished in different scales. It begins with the development of the conceptual and theoretical framework in chapter one, and advances to the evidence-based empirical research from chapters two to five. Chapter two analyses bilateral global migration flow in a gravity model framework, while chapters three and four analyse the mechanisms through which migration policy may alter the housing tenure and locational patterns of immigrants in the destination countries. Chapter five concludes the empirical examination with an analysis of the heterogeneity in the housing patterns of natives and multiple generations of non-natives. The four empirical chapters make use of longitudinal data; however, they draw from a wide array of analytical tools. This chapter (chapter six) provides the summary and conclusion of the thesis and highlights the key research questions, results, application of the research findings; and the theoretical, empirical, practical and policy implications of the research. This concluding chapter also highlights the major contributions which the thesis makes and provides recommendations for improving migration management systems, migration policy and housing policy.

6.1 Global Migration Pattern: the past, present and future

International migration continues to outpace the world's population growth. The global migration stock is currently estimated at approximately 272 million (UN, 2019), and the migration process is induced by several factors, drivers and processes. The choice of the destination country for immigrants is no random choice; the careful selection of destination countries by immigrants is therefore primarily responsible for the current migration trends and patterns. It is noteworthy that countries with larger

population sizes and shorter distances tend to experience a higher bilateral migration flow; and countries of higher economic and political status tend to attract immigrants from countries of lower economic and political status. There is an abundance of descriptive data to back these assertions, however, empirical evidence is scant. This therefore creates the need for further robust empirical analysis, and this study addresses this need.

The first empirical chapter in this thesis (Chapter two) provides valuable insight on the key issues associated with global migration flow. It particularly provides empirical evidence to support the findings in previous research that migrants are increasingly emigrating from developing countries and immigrating to more developed countries; and OECD countries host a large majority of global migrants. Chapter two also reveals that immigrants' dissatisfaction with their current locations is a major driver of migration, and despite the huge costs (financial and non-financial) associated with migration, the high rate of emigration from developing countries implies that most migrants from these countries consider the cost of emigrating to be much lower than the cost of remaining in their current countries of residence. This suggests that push factors such as unemployment, low income, poor education quality, poor quality of life, inequality, poverty, political instability, insecurity, violence and other disasters are perceived as costlier than the financial and non-financial costs associated with migration. The increase in the illegal migration, particularly through dangerous channels and routes further buttresses this point.

The insight from this study has several practical, theoretical and policy implications. First, the evidence that origin-related migration factors appear to be stronger (predominantly related to developing economies) underscores the need for global inequality to be minimised to the lowest levels in order to reduce the current rate of migration. This can be achieved if developing countries address the economic and political issues which are mainly responsible for the desperation of emigrants to risk their lives while seeking better opportunities outside the comfort of their origin countries. This is particularly important for countries which have developed countries within a relatively short distance. Addressing

these issues has the potential to minimise the current mass exodus of immigration to developed countries. A second practical step (based on insight from this study) is that the international community should ensure that some level of migration control is enforced. While acknowledging that migration cannot be stopped entirely, migration controls have the potential to improve the quality of the immigrant stock in the destination countries; and to also improve the prospects of social and economic integration when migrants arrive in the destination countries. Furthermore, this also has the potential to reduce social issues which are often associated with poor integration of immigrants.

Ultimately, the current migration pattern of skilled migrants from developing countries to more developed countries will continue to lead to a brain-drain- where valuable skills and talents which are required to boost the development of the developing countries will end up in more developed countries. Because developed countries are of higher socio-economic status, the new talents and skills which they attract will further boost their development, leading to further global inequality. The highlighted issues underscore the need to ensure that the global community facilitates orderly, safe, healthy and efficient migration and mobility which will significantly contribute to the achievement of the Global Sustainable Development Goals (SDGs).

6.2 Migration Policy, Housing and Regional Structures

There is growing scholarly interest in the comparative analysis of migration policy systems, particularly in relation to migration flow, migration waves and integration. Migration policies are governments' statement of what they intend to do or not to do regarding the selection, admission and settlement of foreign residents in the country. The increase in scholarly interest also aligns with the SDGs, particularly 10.7 which tasks United Nations member states to facilitate "orderly, safe and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies" by 2030. Different countries approach these issues from different angles, hence different groups of immigrants have varying rights, resources and opportunities and are

therefore likely to have different experiences in the destination countries. Scholars and policy makers are therefore increasingly evaluating the existing migration laws and regulations with the aim of developing more sustainable and efficient migration governance frameworks. Several of these studies often focus on the link between migration policy and trade, investment, economic growth, labour market, and education. However, there is an almost absent empirical link between migration policy systems and the housing and the locational distribution of immigrants.

The second and third empirical chapters of this thesis (Chapters three and four) examine the link between migration policy and changes to housing, urban and regional structures. These studies specifically analyse the mechanism through which the changes to migration policy may alter the housing and residential locational patterns of immigrants in the destination country. The UKLS data covering the period 2009-2017 was used to examine the mechanism through which migration liberalisation and restrictions can alter housing and urban markets. Due to the absence of already existing theoretical and conceptual framework in this area of study, the study began with the development of a conceptual framework which illustrates the expected connection between migration policy and housing and residential choices of immigrants; and this framework was further subjected to rigorous empirical test. The results obtained in chapters three and four provide valuable empirical evidence to show that the two key migration policy frameworks (liberalised and restrictive) have the potential to alter the housing tenure and the locational patterns of immigrants. This relationship can be linked to the impact that migration policy has on the selection mechanism of immigrants. The studies also find that restrictive migration policies tend to select immigrants more carefully than liberalised policies. Restrictive policies generally select immigrants that are of higher socio-economic status (such as higher educational attainment, better job prospects, higher wages and income); while more liberal policies tend to be less selective, often creating a wave of immigrants that are generally of lower socio-economic status (lower educational qualification, lower skilled jobs and lower income). This study therefore finds that the variance in the selection mechanisms of immigrants attributed to migration

policy framework variation creates a variation in immigration waves, and these different immigration waves create different housing tenure and locational patterns. The study particularly reveals that restrictive migration policy systems will create a cohort of immigrants that are more likely to experience a faster transition to homeownership, while a liberalised migration policy system will inversely create an immigration wave which will be dominated by immigrants that have a longer and more painstaking homeownership transition. This further suggests that contrary to widespread rhetoric, the introduction of migration restrictions may not necessarily imply adverse implications for immigrants, rather, these restrictions tend to select immigrants that are of higher socio-economic. In addition to this, the study finds that immigrants in a more restrictive policy framework are also more likely to reside in core financial and economic hubs despite the higher cost of living in these areas. This can by explained by the fact that their higher income enables them to afford the higher living cost in the bigger cities. Conversely, immigrants in a more liberalised system tend to select other secondary economic hubs with lower living cost, and this may also be explained by the fact that the cost of living in these secondary locations are lower.

The findings in this study support the theoretical proposition that changes to migration policy systems have the potential to affect regional spatial and neighbourhood patterns. In light of the research of Tanis (2018) which posited that immigrants will always congregate in core economic hubs and areas of social networks, this study offers more insight and expands the knowledge by showing that immigrants will only prefer to reside in key economic hubs and areas of strong social networks if they can afford to the cost of living in those economic hubs. Furthermore, the study reveals that the migration policy structure in place when immigration occurred is key in defining the housing affordability of immigrants and by extension, their housing tenure and locational patterns. Additionally, the findings are consistent with the logical expectation that the relationship between migration policy, housing and residential patterns of immigrants are often stronger in the short-run and weaker in the long-run as immigrants spend more time in the destination countries. Descriptive

evidence (such as Barton, 2017) show that immigrants generally have lower homeownership prospects compared to natives; the results in this study however provide more clarity by showing that the already low homeownership probability of immigrants may be much lower for immigrants that migrated in a more liberalised migration system compared to their counterparts who migrated in a more restrictive system. This further suggests that introducing some level of migration restrictions has the potential to minimise the housing tenure inequality between natives and immigrants.

With the insight which the study provides, more effective and efficient migration and housing policies can be developed to create more equitable housing pathways which can improve acculturation, social cohesion and integration. Because poor and sub-optimal housing outcomes also affect other aspects of life such as employment, wealth, physical and mental heath and wellbeing of immigrants, ensuring that the selection of immigrants is carefully considered will by extension support better housing conditions for the immigrants in the destination country. From another perspective, the insight that different migration policies create different waves of immigrants with variant locational choices underscores the need to develop policies to account for the potential results of these immigration waves, particularly changes relating to the urban and regional landscape. For instance, there may be the need to develop regional and local policies to address the concentration or diffusion of immigrants in certain cities and regions as a result of migration policy changes.

6.3 The Housing Patterns of Natives and non-natives

There is a strong body of literature relating to the variation in the housing pathways of natives and migrants; with a considerable proportion focusing on the factors which may be driving these variations. For instance, the House of Commons Library Report (Barton, 2017) provides some important insight on the remarkable variation in the housing tenure outcomes of natives and immigrants in the UK over the past two decades, with emphasis on regional, lifecycle, ethnicity and country of birth variations. The report shows that private rental has grown across the UK and is most common in London, while

the inverse is the case for homeownership which has declined in the same period. Changes can be observed in the lifecycle stages (a decrease in the less than 34-year olds' prospects of homeownership compared to two decades ago) and other demographic factors such as ethnicity (for instance Whites, Indians and Pakistanis have higher homeownership rates compared to other ethnicities). Most remarkably, the report shows that the households headed by immigrants are less likely to be in owner-occupation and more likely to be in private rental. Some of this information may be referenced in migration-related debates; however, they are merely descriptive and have not been subjected to rigorous empirical analysis; thus unreliable for major policy decisions. This therefore necessitated an empirical analysis of the factors driving the variation in the housing tenure outcomes of natives and non-natives.

The final empirical chapter of this thesis (Chapter five) examines the variation in the effects of socio-economic, socio-cultural, demographic, household and regional factors on the variation in the housing outcomes of natives, second generation migrants and first-generation migrants. This insight is particularly important in the quest for understanding the pace of integration of immigrants in the destination country. This study also makes a significant contribution by providing insight on natives and immigrant generations using heterogeneous models. Previous studies have classified second-generation migrants as either migrants or natives; however, there is evidence that second generation migrants have different life courses from first-generation migrants and from natives. Conventional models are often homogeneous; thus, this study adds more depth and offers more insight on the importance of using a heterogeneous modelling approach for complex and heterogeneous populations (such as the UK which has a huge immigrant stock).

The results in the empirical analysis carried out in Chapter five validates previous research that immigrants have a higher private rental and lower homeownership probability, while natives are more likely to be homeowners compared to immigrants. The results also show that natives, first generation and second-generation migrants have distinct housing tenure patterns. Furthermore, a statistically

significant variation can also be observed in the impact of the drivers of the housing tenure outcomes of natives and non-native groups. In addition to these, it can be observed that the second-generation non-natives have similar housing tenure outcomes to natives than to their parents (the first-generation migrants).

This thesis also sheds more light on the variation in the housing tenure outcomes among immigrants. It reveals that lower homeownership of immigrants is worse for younger immigrants (natural lifecycle effects), and even much worse for immigrants who have spent fewer years in the destination country (migration lifecycle effects). This suggests that the lifecycle theory is limited in scope of application to first generation migrants; and rather than the natural lifecycle effect playing the key role in the housing tenure outcomes of first-generation migrants (as it does in natives and second-generation migrants), the migration lifecycle impact may be more prominent. This further suggests that the number of years which an immigrant spends in the destination country may play a more significant role in predicting the housing tenure transition for the immigrant rather than age. The migration lifecycle effect can be explained by the fact that immigrants need time to build a credit history and make sufficient savings to be able to raise down payment for a home purchase, and they need to spend some considerable amount of time in the destination country in order to achieve these.

The results also show varying effects of educational attainment for the first-generation migrants when compared to second generation migrants and natives; while ethnicity/race is a stronger predictor for the housing tenure outcomes of natives than it is for second-generation migrants and least, for first generation migrants. The results also show that being an urban dweller decreases homeownership prospects for second generation and first-generation migrants, and this may be an indication of affordability challenges which most UK urban dwellers suffer from. Furthermore, the results obtained for regional variations also suggest affordability challenges, particularly considering that living in London decreases homeownership prospects for first generation immigrants and natives, while living

in the regions of North East, South East, South West and Wales decreases homeownership prospects for second-generation migrants compared to living in London.

This study has several theoretical, practical and policy implications. From a theoretical perspective, heterogeneous modelling may offer better insight on heterogeneous populations compared to the conventional homogenous modelling approach. More practically, the results confirm (with empirical backing) that immigrants often arrive the destination country at disadvantaged position in socio-terms and they typically deal with challenges such as down payment constraint, poor credit history, inadequate information etc, thus, migration policies should be developed to ensure that these negative effects are minimised. Immigrants should have access to better information systems which can improve the acculturation experience and a faster transition on the housing ladder. Another important issue that needs to be addressed is the need to pay closer attention to further demographic imbalance associated with migration. For instance, the lower homeownership probability of households headed by female first generation migrants suggests that female immigrants may experience a lot more challenges in the housing market compared to their male counterparts, and this can further exacerbate inequality among immigrants. In terms of policy initiatives, there is the need for migration policies to explicitly account for the housing outcomes of immigrants and general housing market effects. Considering that all immigrants will arrive in the destination country with housing needs which must be satisfied, there is a need to account for the impact that policy changes will have on the housing market. The development of well researched-evidence-based housing solutions will improve the prospects of integration and acculturation of immigrants in the destination country.

6.4 Limitations and Recommendation for Further Study

This thesis makes significant contributions to the body of knowledge in the field of migration and housing economics. These include theoretical propositions backed by empirical evidence as discussed

in the four empirical chapters. Despite the several scales of insight which this thesis offers, there are still limitations. Thus, several research areas are recommended for further research. A key area that should be investigated further is how the different areas of study which form the core of this research (housing tenure and locational choices of immigrants) can influence housing demand, rents, house prices and the mortgage market. While chapter one develops a conceptual and theoretical framework relating to this, it is not tested empirically in this thesis. It will therefore be useful to offer evidence-based insight on these conceptual constructs in order to expand the frontiers of the subject. Expanding the knowledge in this area will also guide policy makers in mapping out adequate plans for anticipated increase in the demand for infrastructure, facilities and amenities that are associated with migration.

Another area that can be expanded upon is the migration generations discussed in chapter five. It will be insightful to expand the models by testing for variations in housing tenure outcomes of multiple generation of natives and non-natives using the decimal calibration as recommended in Rumbaut (2004). These tests can also be further expanded to the locational choices and spatial patterns to shed light on phenomena such as segregation and the evolution of ethnic and socio-economic clusters. Further study is also encouraged to examine the effects of migration policy changes on the housing market dynamics. This will include the use of larger datasets to test similar hypothesis developed in this research, as well as exploring other migration policy framework effects on housing demand, rents, house prices and mortgage demand and supply. It will also be insightful to extend these studies by using non-UK based data in order to expand the scope of application.

6.5 Concluding Remarks

Addressing some of the issues which drive the current global migration patterns- emigration from developing countries and immigration to developed countries is vital for comprehending the current direction of migration flow. There is the need for policy makers- particularly in developed countries where majority of immigrants reside, to develop policies that will ensure that immigration into their

countries is strategically managed, and that immigrants who settle in these countries are not systemically disadvantaged.

Housing is a human need that must be met, hence housing policy in key immigrant destination countries should specifically focus on how immigrants are supported in their journey from arrival to other stages of their migration lifecycle. Literature is fragmented on the exact impact of migration on housing market forces, however, results from this thesis are pointers to the effects which immigrants may have on the housing markets of the key immigrant destination countries. The understanding of this theme is contingent on the knowledge of the housing market equilibrium. Considering the inelastic nature of the real estate supply[67], the housing market is largely driven by demand factors. The theoretical expectation is therefore that an increase in the population of immigrants in an area should lead to an increase in house prices in the short-run (Di Pasquale and Wheaton, 1994; Ohtake and Shintani, 1996), while the long-run effect is a function of housing supply responsiveness. This thesis has shown that immigrants often enter the housing market in the destination country from the rental segment of the market. This suggests that immigrants will have a stronger impact on the rental market in the early stages of their migration lifecycle, thus, the shocks which are generated from waves of immigration should be stronger in the rental market in the short-run. Having established in this thesis that the housing tenure and locational choices of immigrants are key elements of housing demand, it is important to also point out that the response of natives to immigrants' housing patterns also plays a key role in the housing market performance.

The foregoing argument is not to suggest that migration does not affect house prices in the short-run. Because demand in rental values and house prices are related (Goodman, 1990), a fast-paced demand for private rented housing arising from housing market shocks such as a wave of immigrants may lead

[67] Issues such as obtaining building and planning permission, planning and construction lag, finance, among other factors may slow down housing stock adjustment. The adjustment rates vary across local areas depending on local administration policies and regulations, and this creates a variation in the supply elasticity across local areas and regions. According to Ohtake and Shintani (1996), long-run housing elasticity and demographic changes also affect housing stock, and this position is consistent with the proposition that housing supply is both price and income inelastic in the short-run and elastic in the long-run. This basic stock-flow model effectively suggest that house price adjustment equalise the changes in demand in the short-run given the already existing housing supply (Di Pasquale and Wheaton, 1994; d'Albis *et al.,* 2017).

to surplus demand in the rental market which will drive up rents. This may prompt institutional investment which will also increase demand in the housing sales market and a further increase in house prices. It is also expected that as immigrants advance in their migration lifecycle, they transit to homeownership and this may increase prices in the long-run.

Integration is an important element of migration management strategies and housing plays a key role in the integration of immigrations, thus housing policies which are related to migration deserve attention and should be examined and refined where necessary. It is important to ensure that these policies do not place natives in a disadvantaged position, and that the influx of immigrants does not affect them negatively. One of the ways of addressing this is ensuring that housing supply is boosted to meet up with the housing demand which is linked to immigration. In summary, migration policies that make allowance for immigrants to settle in a country should also make adequate provisions for the immigrants to thrive while residing in the country; while also ensuring that the natives in the country are not disadvantaged.

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Appendix 1.1 List of OECD countries

Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

Appendix 2.1 Correlation Matrix for Model in Chapter two

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Migration Flow	**1.0000**														
(2) Log of Migration flow	**0.2637**	1.0000													
(3) Distance	**-0.0709**	-0.3083	1.0000												
(4) Population (Origin country)	**0.0655**	0.2437	-0.0678	1.0000											
(5) Population (Destination count)	**0.0626**	0.2160	-0.0678	-0.0024	1.0000										
(6) Contiguity	**0.1540**	0.2273	-0.3555	0.0649	0.0649	1.0000									
(7) Male/female ratio (Origin count)	**0.0031**	0.0385	0.0063	-0.0789	0.0006	-0.0074	1.0000								
(8) Male/female ratio (Destin count)	**0.0171**	-0.0438	0.0063	0.0006	-0.0789	-0.0074	-0.0053	1.0000							
(9) Life Expectancy (Origin count)	**0.0033**	0.0817	0.0066	-0.0480	0.0123	-0.0211	0.0673	0.0003	1.0000						
(10) Life Expectancy (Destin count)	**0.0311**	0.2395	0.0066	0.0123	-0.0480	-0.0211	0.0003	0.0673	0.0414	1.0000					
(11) Common Official Language	**0.0292**	0.0897	-0.1029	-0.0856	-0.0856	0.1041	0.0127	0.0127	-0.1063	-0.1063	1.0000				
(12) Common Colonial History	**0.0860**	0.1686	-0.0587	0.0528	0.0528	0.0910	-0.0206	-0.0206	0.0473	0.0473	0.1311	1.0000			
(13) GDP share	**0.0297**	0.1194	0.0125	0.0770	-0.0879	-0.0006	-0.0781	0.0799	-0.3869	0.3488	-0.0019	-0.0034	1.0000		
(14) Employment rate (Origin count)	**0.0008**	-0.0140	0.0796	0.1074	0.0001	0.0067	0.1282	-0.0004	-0.2739	0.0043	0.0144	-0.0237	0.1305	1.0000	
(15) Employment rate (Destin count)	**0.0028**	-0.0544	0.0796	0.0001	0.1074	0.0067	-0.0004	0.1282	0.0043	-0.2739	0.0144	-0.0237	-0.1368	-0.0051	1.0000

Appendix 3.1: Correlation Matrix for Model in Chapter three (2004 EU-A10 accession)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) UK regions	**1.000**														
(2) London	**-0.769**	1.000													
(3) EU-A10 _ *EU 15*	**-0.109**	0.160	1.000												
(4) Post/pre EU-A10	**0.278**	-0.361	-1.000	1.000											
(5) Post/pre EU15	**0.016**	0.003	-1.000	.	1.000										
(6) Time until retirement age	**-0.033**	-0.013	0.100	0.010	0.038	1.000									
(7) Degree	**-0.062**	0.103	0.020	-0.104	0.092	-0.153	1.000								
(8) Household income	**-0.178**	0.227	0.120	-0.185	0.016	-0.168	0.299	1.000							
(9) Employment status	**0.026**	-0.015	-0.177	-0.017	0.013	-0.326	0.125	0.235	1.000						
(10) Male	**-0.008**	0.025	-0.049	0.096	-0.026	-0.033	-0.105	0.033	0.174	1.000					
(11) Living with spouse	**-0.005**	0.029	-0.205	0.048	-0.079	-0.348	0.103	0.118	0.198	0.010	1.000				

(12) Number of children	**0.002**	-0.016	-0.166	0.021	0.001	-0.125	0.031	-0.135	0.008	-0.071	0.442	1.000			
(13) Expects to move	**-0.060**	0.060	0.036	-0.049	0.080	0.115	0.011	-0.000	-0.026	0.009	-0.107	-0.082	1.000		
(14) Tenure	**0.054**	-0.088	-0.084	0.158	0.092	0.195	-0.325	-0.384	-0.192	0.011	-0.287	-0.153	0.088	1.000	
(15) Wave	**-0.027**	0.008	-0.032	0.049	-0.060	-0.189	-0.030	0.049	0.032	-0.018	0.049	0.116	-0.173	0.010	1.000

Appendix 3.2: Correlation Matrix for Model in Chapter three (Commonwealth)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) UK regions	**1.000**														
(2) London	**-0.848**	1.000													
(3) *CW_nCW*	**0.162**	-0.154	1.000												
(4) Post/pre-CW	**-0.032**	0.065	-1.000	1.000											
(5) Post/pre nCW	**-0.029**	0.031	-1.000	.	1.000										
(6) Productive life	**-0.039**	0.028	-0.103	0.082	0.091	1.000									
(7) Degree	**-0.006**	0.017	0.044	0.006	0.035	0.133	1.000								
(8) Household income	**-0.015**	0.013	0.051	0.015	-0.061	0.001	0.332	1.000							
(9) Employment status	**0.027**	-0.037	-0.024	0.024	0.191	0.296	0.234	0.310	1.000						
(10) Male	**0.004**	-0.013	-0.021	0.031	-0.029	-0.042	0.052	0.003	0.156	1.000					
(11) Living with spouse	**0.042**	-0.056	-0.158	0.071	0.054	-0.060	0.077	0.120	0.125	0.129	1.000				
(12) Number of children	**-0.020**	0.006	-0.171	0.076	0.067	0.381	0.048	-0.116	0.145	-0.026	0.306	1.000			
(13) Expect to move	**-0.025**	0.022	-0.000	0.031	0.006	0.245	0.084	-0.011	0.037	0.013	-0.103	0.025	1.000		
(14) Tenure	**-0.208**	0.239	0.043	-0.054	0.111	0.259	-0.183	-0.291	-0.176	-0.038	-0.298	0.068	0.146	1.000	
(15) Wave	**0.026**	-0.035	-0.023	0.031	-0.006	-0.125	0.021	0.118	0.051	-0.018	0.030	-0.018	-0.117	-0.056	1.000

Appendix 4.1 Correlation Matrix for the Chapter four (2004 EU-A10 Accession)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Tenure	**1**														
(2) Ownership	**-0.834**	1													
(3) EU-A10 _ *EU 15*	**-0.089**	0.121	1												
(4) Post/pre EU-A10	**0.144**	-0.1	-1	1											
(5) Post/pre EU15	**0.095**	-0.1	-1	n/a	1										
(6) Time until retirement age	**0.182**	-0.148	0.007	-0.053	0.054	1									
(7) Degree	**-0.319**	0.276	0.066	-0.031	0.172	-0.072	1								
(8) Household income	**-0.382**	0.368	0.153	-0.076	-0.003	-0.164	0.335	1							
(9) Employment status	**-0.133**	0.04	-0.163	0.065	-0.001	-0.169	0.063	0.215	1						
(10) Male	**-0.033**	0.012	-0.029	0.125	-0.169	-0.103	-0.089	0.034	0.222	1					
(11) Living with spouse	**-0.277**	0.302	-0.181	0.112	-0.131	-0.232	0.025	0.154	0.172	0.152	1				
(12) Number of children	**-0.155**	0.176	-0.115	0.013	-0.012	-0.037	0.028	-0.167	-0.063	0.003	0.376	1			
(13) Expects to move	**0.118**	-0.225	0.041	-0.061	-0.061	0.149	-0.009	-0.031	-0.008	-0.014	-0.129	-0.113	1		
(14) UK regions	**0.025**	-0.026	-0.078	0.134	-0.02	-0.12	-0.002	-0.176	0.087	-0.009	0.022	0.005	-0.014	1	
(15) Wave	**-0.012**	0.127	-0.065	0.11	-0.09	-0.252	-0.071	0.059	0.05	-0.015	0.059	0.154	-0.16	-0.019	1