

# Chapter 1

## Geographic Labor Markets, Aging and Migration: A Panoramic Perspective



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### 1 Introduction

Older population cohorts are growing disproportionately faster than younger cohorts. This is a trend that is affecting countries and regions to different extents. At the same time, another demographic process that is also impacting on many regions is migration. Today, many migration movements are episodic and thus more

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unstable than in the past (e.g., from famines, war, political turbulence and natural disasters), as illustrated by the growth of return, circular and temporary or chain migration. In fact, at the same time these growing and emerging types of migration are occurring the distinction between migration and commuting is blurring, e.g., those who are commuting across continents and intercontinentally might also be viewed as temporary migrants. As with aging, there are great differentials in the manifestation of these processes across places, regions and nations and in turn in their impact on regional labor markets.

The dynamics of these major demographic and population processes (aging and migration) have become topics of considerable concern for researchers and policy makers (Turchin 2003). This book provides not only summary and descriptive contributions about these trends and labor market stability/instability, but also modelling and policy-centric empirical chapters that includes new and expanded knowledge about their effects on geographic labor markets. The contributions are focused in part on the European context, however they also provide broader insight from empirical analyses drawing on data from North and South America, and Australasia.

Aging has become a universal megatrend in many countries, with far-reaching consequences for the welfare state, public finance, consumption and mobility patterns, and labour force participation (Guerin et al. 2015 and UNICEF 2015). It is increasingly recognized that the consequences of an aging society may exhibit different patterns on a regional system, depending on the demography, quality of life and economic resilience of these regions. For example, declining labour force participation as a result of the aging process may be compensated for through other demographic factors such as international migration, extended participation of older cohort members, higher productivity of younger cohorts and application of productivity enhancing new technologies.

It is noteworthy that the spatial distribution of migration flows shows also heterogeneous patterns in national-regional and regional systems, so that migration is not by definition a panacea for solving the aging issue. For a regionally heterogeneous labor market, aging and migration may sometimes be mutually complementary and sometimes mutually conflicting phenomena. Overall the research presented underscores findings that show the current and future powerful driving force that migration and aging are having on spatial labor markets; but the nature of the effects is heterogeneous across nations and subnational regions.

The aging and migration megatrends and their impact on spatial—regional and local—labor market performance is the core theme of this book and thus together define its scope and range. A number of basic thematic efforts appear in the various contributions. These are:

- An informed and broad inventory of aging and migration issues in various countries.
- Analysis of the heterogeneous impacts of these developments in regional labor markets.
- Systematic examination of data bases and related empirical analyses that enable mapping out the complex and dynamic nature of these developments.

- Utilization of various contemporary economic and modelling techniques to analyse the above referenced complex regional labor market developments.
- Critical review and assessment of various policy measures that are or may cope with the effects of aging and migration effects on regional labor markets.

At the same time, while these themes are prominently represented, there are two additional recurring themes that also cut cross the contributions and their findings: technological change and forced migration (International Organization for Migration 2016 and Turchin 2003). Technological change in such areas as IT, biotechnology, and robotics are impacting and will continue to affect not only the structure and performance of regional labor markets but also many real-world elements of society, e.g., transportation and logistics, social relations, shopping and procurement, work, retirement, entrepreneurship and innovation. Forced migration from war, political turbulence and natural disasters, the second recurring theme in this volume is creating major impacts on labor market performance and dynamics in both emerging and developing economies as well as in developed economies. Most of the forced migration effects will continue to be negative. So, technology and technological change, and forced migration are also factors that may be seen as intervening variables in a world where aging and migration are impacting regional labor market performance and stability.

The idea and motivation for this book stem from various systemic and general changes in demographic structure and migration patterns and the unprecedented effect these changes are having and will have on regional labor markets. Two general demographic structural changes that are occurring broadly in the world are considered in the various contributions in this volume. The first of these is a disproportionate growth of seniors in the populations of many countries. This aging trend means that other cohorts, usually the working age cohorts, are experiencing relative contraction. Such change alters the structure of labor markets and thus can lead to major disturbing effects which in turn can impact a host of other processes including labor supply and demand, economic development, employment and unemployment, welfare, health, public finance, consumption, mobility and immigration. The other structural change is the growth of large youth (ages 18–29) cohorts, especially in developing countries (and to some extent also in developed countries) that are underemployed or unemployed. Clearly, this pattern is of huge importance, but it is not the primary focus of this book, although several of the contributions consider related issues.

The importance of migration is, among other things, its potential to offset effects of aging in regional labor markets. While migration can be a policy focus for managing labor market effects of aging, its ability to do this must be viewed in the context of the nature of migration in contemporary times where its forms include temporary, circular, return and chain migration. The motivation for this book is then to examine the effects of aging (and to some extent growing youth population cohorts) on regional labor markets and the role migration is playing and may play in softening the disruptive effects of demographic structural changes in regional labor markets.

Gaining an improved understanding of the impact that aging is having on regional labor markets and how migration may be a mitigating factor are the primary motivations for this book. However, given the relatively unique nature of the potential aging impact, it also seeks to bring new and creative conceptual frameworks and methodologies to facilitate greater insight into the aging impact and migration. Along with new theoretical and conceptual views and methodologies and new empirical findings policy lessons were also envisaged. In short, the editors expect that the aging impact on regional economies and migration themes would not only motivate, but also lead to new developments, methods, insights, policy and management views on regional labor market functionality.

## 2 Organization of the Book

The reader will find a rich inventory of the various aging and migration issues and their expression in the opening chapters of the book, **Part A** of this volume. Their heterogeneous impacts on regional labor markets are analysed in subsequent chapters. Furthermore, many of the papers in this volume systematically map out the complex and dynamic nature of these impacts and their related public policy implications. In **Part B**, the focus of the chapters narrows, as these contributions employ contemporary economic and statistical modelling techniques to bring greater analytical clarity to the range and diversity of the impacts of aging and migration effects on regional labor markets. Moreover, in **Part C**, the chapters provide empirically based policy analyses and proposals for coping with the impacts of changing aging and migration behavior. In short, the book provides a descriptive and definitional inventory of aging and migration driven problems and modelling and empirical analyses of the driving effect of aging and migration on regional labor markets along with an assessment of relevant public policies on regional labor markets.

The book is organized around three major topical areas in a total of 16 chapters including this Introduction. First, **Part A** offers a general framing of issues and addresses aging and migration problems (the aging-migration nexus) as well as the implications these processes are having in particular on regional labor markets. Short summaries of the two chapters that contribute to and define this part of the book are presented hereafter. Next, **Part B** addressing intriguing issues on advanced modelling of modern population geography focuses specifically on modelling approaches and associated statistical analyses in six chapters. These offer contemporary—and/or adaptations of more traditional modelling—approaches for examining the impacts of aging and migration, often from a policy perspective, on spatial labor markets and spatial development. Finally, six papers provide the content of **Part C** which consists of empirical analyses of aging and migration and their impact on geographic labor markets and relevant policy issues. Abstracted versions of each of the chapters for **Parts A, B** and **C** appear below. The title and authors' names for each chapter are also presented.

### 3 The Century of Migration and Aging: A Review of Labor Market Effects

The first paper in **Part A**, Chap. 2, is by Bruce Newbold and is entitled “Aging and Migration: An Overview”. Newbold argues that aging is a growing global phenomenon, with some countries already seeing dramatic aging, and others just starting to see their populations age. With older cohorts representing an increasingly large proportion of the world’s population, the implications of aging societies include a diverse set of issues and processes such as economic development, welfare, public finance, consumption, mobility patterns, migration and immigration. This chapter covers the demography of aging before moving on to consider the linkages between migration, immigration and aging along with policy options associated with aging societies. As societies age, larger numbers of the old will be mobile, although it is unlikely that the mobility rate will increase. Although internal migration can redistribute older populations across space, with implications for sending and receiving regions, Newbold concludes that this will not change the overall population profile of a country. Instead, immigration is the most likely option to reduce or slow the aging of a population, but it too is limited in its effect.

The second paper, “Fortunado’s, Desperado’s and Clandestino’s in Diaspora Markets: The Circular ‘Homo Mobilis’”, Chap. 3, is authored by Karima Kourtit, Peter Nijkamp and Masood Gheasi, and examines how world demographic patterns (e.g., aging processes, birth and death rates) are increasingly influenced by migration movements. Rising numbers of people are ‘on the move’, in search of better fortunes elsewhere. It is noteworthy that nowadays many migration movements no longer show stable patterns, but reflect a high degree of dynamics, for instance, in the form of return migration, circular and temporary migration, or chain migration. There is also great heterogeneity in the motivations of many migrants that may have significant impacts on the migration choice, the destination place, the migrant’s status, and the duration of stay. Consequently, return migration, temporary migration and circular migration have in recent years become important research and policy issues. This chapter offers a review of the dilemmas and assessment issues inherent in the effects of non-structural or temporary migrants (the so-called cross-border ‘movers’) on host economies. Particular attention is paid to circular migration policy in Europe as a vehicle to both mitigate temporary tensions on regional labor markets of host economies and to provide a solid base for sustainable growth in the sending countries. Various research and policy challenges are also considered.

### 4 The Dynamics of Modern Population Geography

Bo Feng, Mark Partridge and Mark Rembert provide the first paper in **Part B**, Chap. 4, entitled “*The Perils of Modelling How Migration Responds to Climate Change*”. The authors begin with the observation that the impact of climate change has drawn

growing interest from both researchers and policymakers. Yet, relatively little is known with respect to its influence on interregional migration. The surge of extreme weather conditions could lead to the increase of forced migration from coastal to inland regions, which normally follows different patterns than voluntary migration. However, recent migration models tend to predict unrealistic migration trends under climate change in that migration would flow towards areas most adversely affected. Given the great uncertainty about the magnitude and distribution of severe weather events, it is nearly impossible to foresee migration directions by simply extrapolating from the data on how people have responded in the past to climate and weather. For example, weather events will likely occur far outside of what has been observed. Other issues include poor climate measures and a poor understanding of how climate affects migration in an entirely different structural or institutional environment. Unintended consequences of public policies also contribute to the complication of predicting future migration patterns. In this paper, the authors survey the limitations of the existing climate change literature, explore insights of regional economic studies, and provide potential solutions to those issues.

Tomaz Ponce Dentinho provides the next paper, Chap. 5, in **Part B**, entitled “*Migration Pressures and Responses in South Asia*”. Globalization involves also a group of poor and nearby nations in South and Southeast Asia that send migrants to rich countries in the western world, to dependent countries in the Middle Eastern Gulf area and to emerging and developed economies in Asia. These patterns influence the way we see and react to migration from these poor and developing nations. The aim of the chapter is to examine and understand the impact of institutional barriers in migration in this context. The chapter examines several research questions: What are likely effects if institutional barriers cease to exist? What will happen with the collapse of the oil rents in the Middle East? What might happen with a development take-off of some countries in the region? To answer these questions the paper presents a contextualization of South Asia in the World, uses a migration model to identify the demographic, economic and institutional factors that push and pull migration in the region. The conclusion proposes an interpretative synthesis of the research results and future work on the impact of institutional barriers on migration.

Ana Maria Bonomi Barufi examines “*Lagging Regions and Labor Market Dynamics in Brazil*” in the next Chap. 6. She observes that agglomeration economies reinforce the concentration of economic activity that in turn stimulate unbalanced growth and uneven development. In this context, she argues that the development of lagging regions will largely depend on government intervention, as market forces by themselves are unlikely to overcome polarization effects and may actually increase regional inequality. Given these circumstances, migration helps to explain the spatial distribution of workers and the skill composition of the local labour force. At a first glance, migration should be able to equalize real regional wages, but instead, it ends up reinforcing regional disparities. Therefore, this chapter aims to examine the main behavioral and policy implications from the regional concentration of production resources of lagging regions in Brazil. More specifically, the composition of the local labour force is dependent on pull factors for specific skills that may arise from

agglomeration economies. Consequently, this chapter also explores the probability of losing or attracting workers with different skill levels, given an initial level of local development.

The next paper, Chap. 7, focuses upon “*Migration and Aging in Expanding and Shrinking European Regions*”. It is authored by Mats Johansson, Pia Nohsson and Hans Westlund. At the outset, the authors note that Europe is in a phase of vast transition seen from both demographic and economic-structural perspectives. Studies have shown that demographic development differs considerably when comparing urban regions with more sparsely populated and peripheral regions. Such patterns are shown to be especially strong in the northern and eastern parts of Europe, where a redistribution of people has been contributing to concentration in metropolitan or big cities and to shrinkage and depopulating of rural and peripheral areas. This chapter empirically examines these differing demographic development paths by analysing the influence of key underlying demographic factors on population change across European regions. Typologies based on both economic and demographic structure and cross-regional regression modelling are employed to examine these patterns. The economic-structural typology developed within a European project is used to describe and analyse economic-structural factors. A typology based on demographic characteristics that classifies regions as either shrinking or expanding in terms of population is deployed in the empirical assessment. The findings support a conclusion that age structure is of importance with regard to population changes and that there exists an east–west divide between the growing west and declining east where the declining sectors are more frequent. It is also shown that large and densely populated regions have better preconditions for growth and less risk of shrinking than small and sparsely populated ones.

The next paper in **Part B**, Chap. 8, is entitled “More pensioners, less income inequality? The impact of changing age composition on inequality in big cities and elsewhere”, and is authored by Omoniyi B. Alimi, David C. Mare, and Jacques Poot. Like most of the developed world, New Zealand’s population is aging both numerically and structurally. Population aging can have important effects on the distribution of personal income within and between urban areas. The age structure of the population may affect the distribution of income through the life-cycle profile of earnings but also through the spatial-temporal distribution of income within the various age groups. By decomposing New Zealand census data from 1986 to 2013 by age and urban area, this chapter examines the effects of population aging on spatial-temporal changes in the distribution of personal income to better understand urban area-level income inequality (measured by the Mean Log Deviation index). The authors focus explicitly on differences between metropolitan and non-metropolitan urban areas. New Zealand has experienced a significant increase in income inequality over the last few decades, but population aging has slightly dampened this trend. Because metropolitan areas are aging slower, the inequality-reducing effect of ageing has been less in these areas. However, this urban-size differential-ageing effect on inequality growth has been relatively small compared with the faster growth in intra-age group inequality in the metropolitan areas.

The ‘pensionado society’ does not only have implications for regional labour market conditions, but also for the demand for ‘pensionado’ amenities. Robert J. Stimson and Tung-Kai Shy are the authors of Chap. 9 which is entitled “*Analysing the Demand for Retirement Housing: The Australian Context*”. They begin by observing that population aging, which is being driven-up as the ‘baby boomer’ generation reaches the traditional retirement age, is expected to generate an increased demand for housing alternatives that are more suitable for older people, including retirement village living. Key questions that are asked in this chapter are: (a) what will be the level of propensity for older people to seek to ‘downsize’ rather than ‘age in place’? (b) what will motivate them to do so?; (c) what role will retirement villages play as a housing alternative for older people and what will be the level of demand?; and (d), what will be the locations that are best for the development of new retirement villages? Demographic and spatial modelling approaches as developed by regional scientists are helpful to address these questions, including how to assist retirement village developers identify where optimal locations might be for developing new retirement villages that would maximize proximity to the likely aged cohorts that have a high propensity to choose to relocate to live in a retirement community; and to estimate the likely take-up rate that might occur if a new retirement village was to be developed on a specific site that is available to a developer.

Population dynamics may also leave a footprint in a firm’s productivity achievement. The final chapter in **Part B**, Chap. 10, is entitled “*Demographic Transition and Firm Performance: An Empirical Analysis for Germany*”, addresses this issue. The authors are Stephan Brunow and Alessandra Faggian. This paper presents an original analysis of the channels that reduce the dependency ratio on plant productivity in Germany. Of the three channels considered: (1) increasing female participation; (2) increasing elderly participation; and (3) immigration, the least problematic for increasing productivity appears to be female participation, although the effect of part-time work is unclear and needs to be further examined. The results of the other two channels, especially immigration, are more mixed and require additional research to better determine their effects, for example, decomposing the analysis by specific industries and/or occupations rather than a broader whole economy study. The insignificant findings in this study, for especially immigration, may be due to heterogeneity among immigrant workers in terms of the jobs and sectors chosen or to a differential selectivity of immigrants by potentially less productive firms.

## 5 Regional Labor Market Transitions, Aging and Migration

Thomas de Graaff, Daniel Arribas-Bel and Ceren Ozgen are the authors of the first chapter in **Part C**, Chap. 11, “*Demographic Aging and Employment Dynamics in German Regions: Modeling Regional Heterogeneity*”. The authors observe that the persistence of high youth unemployment and dismal labor market outcomes are



imminent and current concerns for most European economies. The relationship between demographic aging and employment outcomes is even more worrying, once the relationship is examined at the regional level. The authors focus on modelling regional heterogeneity. They argue that an average impact across regions is often not very useful, and is conditional on the region's characteristics resulting in measured impacts that may differ significantly. To address this issue, the authors advocate the use of modelling varying level and slope effects, and specifically, to cluster them by the use of latent class or finite mixture models (FMMs). Moreover, in order to fully exploit the output from the FMM, self-organizing maps are presented to help understand the composition of the resulting segmentation and as a way to depict the underlying regional similarities that would otherwise be missed if a standard approach was adopted. The proposed method is applied in a case-study of Germany where the analysis shows that the regional impact of young age cohorts on the labor market is indeed very heterogeneous across regions and the results are robust against potential endogeneity bias.

The next chapter by Vicente Rios and Roberto Patuelli, Chap. 12, entitled "*What is the Effect of Population Aging in Regional Labor Market Fluctuations of Germany? A SVAR with Zero-Sign Restrictions Approach*", is adopted for examining this research question. The authors observe at the outset that population and workforce aging have been shown to have a major influence on growth paths and public finance, as different demographic compositions affect productivity and innovative capacity, and therefore potential growth, as well as macroeconomic processes such as public spending for health, welfare, or tax collection. The relationship between aging and labor market variables has been studied before, but always using a single equation analytical method, where only one particular labor market outcome has been related to aging. The problem of such analyses is that labor markets are multivariate systems and their related variables are closely linked with each other through supply and demand. Therefore, neglecting potential endogenous interactions between them may induce bias in the results of empirical analyses. This study examines and aims to fill this gap, as it analyses the role of population aging in the labor market dynamics of West Germany, and subsequently for a sample of ten West German NUTS-1 regions during the period 1970 to 2014. To that end, a Bayesian Structural Vector Autoregressive (SVAR) model is calibrated which includes the following variables: wages, participation rates, unemployment rates and the working-age dependency ratio as an indicator of population aging. Structural labor market shocks are identified using zero-short run restrictions and the assumption that aging is the most exogenous variable in the system. The findings suggest that labour demand shocks have a relevant effect in the short run, while labour supply explains the largest extent of uncertainty over longer periods. The role of wage-bargaining and population-aging shocks appear to be less important, although specific periods show an increased role for such shocks in determining labor market outcomes.

The next chapter in **Part C**, Chap. 13, estimates the effect that changes in the size of the youth population have on the wages of young workers. The chapter is entitled "*Regional Population Structure and Young Workers' Wages*", and is authored by

Alfred Garloff and Duncan Roth. Assuming that differently aged workers are only imperfectly substitutable, economic theory predicts that individuals in larger age groups earn lower wages. A test of this hypothesis for a sample of young, male, full-time employees in Western Germany during the period 1999–2010 is conducted. Based on instrumental variables estimation, it is observed that an increase in the youth share by one percentage point is predicted to decrease a young worker's wages by about 3%. Moreover, the results suggest that a substantial part of this effect can be ascribed to members of larger age groups being more likely to be employed in lower-paying occupations.

The authors of Chap. 14, Marco Modica, Aura Reggiani, Nicola De Vivo and Peter Nijkamp, entitle their study as *“Aging and Labor Market Development: Testing Gibrat's and Zipf's Law for Germany”*. Gibrat's and Zipf's laws describe two very well-known empirical regularities in the distribution of settlements. Many studies have focused on the analysis of both of these regularities, stimulated by the idea that an accurate description of the distribution of people in space is important for both policy-relevant purposes and for specifying more appropriate theoretical models. However, the existing literature provides an analysis of Gibrat's and Zipf's laws without taking into account the demographic characteristics of the population under analysis. Given the fact that many countries, and especially those in Europe, will become aging societies in the decades to come, the aim of this chapter is to provide a more accurate description of the distribution of people, taking into account the demographic differences between people. In this analysis, the focus is on both municipal population (place of residence) and employment (place of work) data for Germany between the years 2001 and 2011. Evidence of different behaviour in the cohorts of older people is provided as well.

The authors of Chap. 15, entitled *“Career Moves: Migration Histories of Selected Regional Workforces in Bendigo, Australia”*, are Fiona McKenzie and Jonathan Corcoran. The mobility of young adults is often related to education and employment. In Australia, there is a strong regional dimension to this mobility, with state capital cities like Melbourne attracting people from non-metropolitan regions. Spatial patterns of skills accumulation and deficit arise from youth migration to cities, and this continues to be a concern for regional policy makers seeking to boost non-metropolitan growth. However, despite the net flows of human capital towards capital cities, many regional centres still maintain diverse economies and many professional workers choose to locate there. To better understand the characteristics and migration histories of these professional workers, a survey of three workforce samples was undertaken in the city of Bendigo (150 km from Melbourne). While it was expected that metropolitan areas would play a role in migration pathways and skills acquisition, variation was found between the workforces, with one proving to be very regional in its character while the others drew workers from both metropolitan and rural areas. Spatial patterns of human capital accumulation are explored in this paper with a view to understanding where such capital is developed and where it is subsequently located. Such analyses can assist policy makers in developing more effective attraction and retention strategies for regional Australia.

Both aging and migration induce unprecedented dynamics on regional labour markets. Clearly, these megatrends are not exclusively separate factors operating independently of the remaining part of the economy. On the contrary, labour markets are increasingly operating in a new technological and institutional arena where next to population dynamics also productivity-enhancing technologies and economic perturbations play a key role. Consequently, population dynamics, technological progress and spatial labour markets are mutually process-interwoven phenomena. Against this background, Uwe Blien and Oliver Ludewig are the authors of Chap. 16, the final chapter of **Part C**, which is entitled “*Compensation or Substitution: Labor Market Effects of Technological Progress and Structural Change*”. The authors note that technological progress can have contradictory effects on employment development and hence on spatial labor markets. On the one hand, there is a substitution effect, because the same product can be produced with less labour. On the other, there is a compensating effect, because prices will be decreased and therefore product demand and also labour demand will be increased. In this study, the relative strength of the two effects is discussed and a brief empirical analysis for Germany is given.

In summary, the present volume presents a range of new perspectives and advanced modelling experiments on the nexus of aging, migration and local or regional development, in particular labor markets. This nexus appears to be a complicated phenomenon, in which the different vectors in this force field are not easy to disentangle. Solid statistical data bases and modern statistical econometric tools are a *sine qua non* for an enhanced understanding of the complexity of labor markets in an aging and open world. Similarly, labour market policy is fraught with many uncertainties and contradictory forces, which can only be unravelled by using sophisticated research tools.

## 6 Value of the Book and Its Contributions

The book provides value added contributions to the literature on labor market functionality, aging and migration research. Here, we provide encapsulated examples from the book that illustrate its important contributions. Clearly, one of these appears in Chap. 2 which provides a literature review on migration, aging and the confluence of these with regional labor market processes. Others are elaborated in the following paragraphs.

### 6.1 Conceptual and Framework Contributions

There are several places in this book where new and improved conceptual framework contributions appear. For example, Chap. 3 shows the diversity or heterogeneity of motivations that drive migration behavior including the more traditional

goal to permanently relocate. However, more recent types of migration where motivations are more complex such as return, circular, chain and temporary moves are also examined. It is also observed that the more recent forms of migration might be used to mitigate temporary and possibly longer-term tensions in the regional labor markets of Europe and elsewhere. Another novel conceptual contribution, migration motivated by climate change, is examined in Chap. 4, where it is concluded that climate change is difficult to predict and thus also any associated migration response. Consequently, linking migration to climate change is difficult to achieve with any accuracy, particularly at the local and regional level. The authors conclude that future effort should be focused on improving climate change measurement and policies to guide community adaptation and resilience in the face of extreme climate events.

Another interesting contribution is presented in Chap. 5 where the institutional barriers to migration are examined in the face of physical, and human and societal pressures such as famine, war, poverty and so on in South Asia. South Asia is a fruitful context for this research given the huge divergences between poverty and development among nations and regions which produce a variety of motivations for migration.

A final example is presented in Chap. 15 where career moves (and migration) of different workforce professionals to the Bendigo Region in Australia are examined. This research shows that bank employee career changes tend to result in moves in and about the Bendigo Region, while health/hospital and council sectors in Bendigo tend to draw employees from broader metropolitan and rural areas and locations outside the region. The difference in these career type groups migration behavior is partly in keeping with the general trend for professionals to migrate to metropolitan centers but also indicates that not all professional types of behavior can be explained by metropolitan population center pull forces. These examples illustrate some of the novel thinking and research concepts and frameworks that appear in the present book.

## **6.2 *Methodological Contributions***

There are also new methodological contributions, not the least of which are illustrated by the research methodology used and introduced in the Bendigo analysis above (Chap. 15) and by the examination of the relationship between climate change and migration (Chap. 5). However, there are several others. For example, research reported in Chap. 14 which shows that traditional applications of Gibrat's and Zipf's laws to a set of regional units vary, when they are recalibrated for sub-populations such as the aged cohort. Further, it is observed that population and employment do not vary evenly across spatial units, so that results of applications of Gibrat and Zipf laws will differ depending on the variable used to calibrate their applications. This provides evidence for the importance of considering these and other variables in the interpretation of the results of applications of Gibrat's and Zipf's Laws.

Another example (Chap. 11) is a case where different methodologies are combined to examine the relationship between demographic aging and regional labor market employment levels. The authors hypothesize that there is considerable variance in the nature of this relationship across regions in Germany, i.e., heterogeneity is likely a key factor. Regression techniques combined with Finite Mixture Modeling (FMM) are used to create self-organizing maps of regions with similar relationships between demographic aging and employment. This synthesis of modeling techniques is used to examine the impact of young age cohorts on regional labor markets which are shown to be heterogeneous and that exhibit different levels of resilience. These are samples of some of the creative methodological approaches used in the book.

The book also offers a wide and diverse array of empirical findings regarding the dynamic relationship between aging and dynamic demographic structural elements, as they impact regional labor markets. Some of these findings have been referenced in the discussions above on new conceptual and methodological contributions of the book. The focus here is largely on empirical findings and their policy implications.

### ***6.3 Empirical Contributions***

A collage of empirical findings is presented below drawing from several different chapters along with their policy implications. Here the focus is on empirical findings related to the relationship between structural demographic change, for example, in aging and youth cohorts and labor market functioning. Other empirical and policy related findings are presented above in the examples provided.

Several chapters argue conceptually and on the basis of empirical research that the impact of aging and other structural demographic elements will be heterogeneous across regions. One of the most emphatic is Chap. 11, in which an analysis of German regional data reveals that the impact of youth cohorts on labor market performance is heterogeneous across regions. While heterogeneity is usually an assumption in studies of groups of regions, this is not always true. But the work in the book clearly demonstrates the importance of variability across regions.

In Germany and other countries where the population is expected to decline in the near future, the working age population is expected to shrink faster than the aged or pensioner cohort which will put pressure on the welfare system. Analysis of a policy of exhausting the available labor from such sources as females, older workers and immigration finds that this policy would not harm firm productivity, despite the absence of a strong positive relationship of such a policy and firm level productivity (Chap. 10).

Population aging is often assumed to be associated with increased worker participation and reduced unemployment levels. However, research presented in Chap. 12 finds that the initial effect is as expected, but that later the participation rate decreases and the unemployment level increases, i.e., the pattern reverses over time. Also, this work finds that the impact of a larger aging cohort on the regional

economy is felt most in the wage effect. This study uses data from ten federal states of Germany between 1970 and 2014.

An examination of survey responses from a sample of West German young male full-time employees over the period 1999–2010 finds that an increase of 1% in the youth share of employment is associated with a 3% decrease in youth wages (Chap. 13). Further analysis suggests that the above result occurs due to spillover effects: members of larger age groups likely move relatively into lower paying occupations.

## **6.4 Policy Contributions**

Both aging and migration are vectors that are disequilibrating forces impinging on regional labor markets. While these factors are not problematic forces in all regional labor markets, they are impacting factors for many. Disproportionate aging changes the source of labor and thus the structure of the labor market. As seniors become a more dominant element of the population, the proportion of the traditional working age cohort will decrease which implies that maintenance of the regional economy must change. The various changes that might be considered in a seniors-dominated region could be via technological change (e.g., robotics), extending employment age of the seniors-cohort, expanding employment of other cohorts, e.g., women, younger cohorts (via lowering the child labor age for seasonal work), selective migration, and possibly structural economic change to less labor intensive activities. Many of the chapters provide policy suggestions aimed at use of these various adjustment approaches and for managing the institutional barriers (see Chaps. 4 and 5) to their deployment, e.g., see chapters and the unexpected effects that occur in some cases (see e.g., Chaps. 6, 7, 8, 12, 13 and 15).

The changing nature of migration includes not only permanent moves but also temporary, return, circular and chain moves thus creating new alternatives for using migration policy as a novel way to adjust regional labor markets. Most of the chapters in keeping with this view of migration, view it as an adjustment mechanism for addressing labor market disequilibria (see for example, Chap. 10). At the same time, migration can also be seen as a disruptive force, e.g., when migration leads to labor market dysfunctionality due to an excess of in-migration leading to higher dependency levels. The contributions included here have only to a limited extent considered this role of migration in labor market performance.

Some of the chapters in this volume examine the appropriateness of labor market policy in other ways. For example, Chap. 2 in the context of sustainable growth, Chap. 4 in the context of climate change, Chap. 6 in the context of lagging regions, and Chap. 15 in the context of relationships between migration of young adults and occupational structure and performance of regional labor markets.

As illustrated with these examples, aging and other structural changes in the population distribution are impacting and will impact efficiency and equity in the operation of regional labor markets. But these are only illustrative examples from the great many contributions in the book. There are of course many other findings beyond these examples.

## **7 New Research Pathways and Data Bases**

New findings regarding the performance of regional labor markets in response to aging and other structural changes lay a foundation for future research. Clearly, other topics such as the role of migration in labor markets and change are examined and provide a basis for future research into how the evolution in migration types (temporary, circular, chain and return) might offer instruments for managing disequilibria in labor markets. On the other hand, such new contemporary migration forms could also be the source of such labor market disequilibria.

Beyond these general observations on possible future directions that the research reported here might take, there are several specific topics that are worthy of comment. One of these is that more than half of the papers in the book are empirical, which most of these use German regional data for the empirical analysis. Future research is needed using data from other countries and regions to test for the generalizability of the new findings presented herein.

Further, there are perhaps other novel ways to obtain data for research examining the interface between population structural changes and the performance of labor markets in this era of big data. Such data which is not only large but often is in a state of continuous growth and evolution rather than fixed data sets, as in the past, offers a variety of alternative ways to construct research into the topics addressed in this volume. Moreover, there are ways using social media and communication in the form of near or real-time data to conduct quasi-experimental analyses or to draw numerous samples that enable producing many analyses and tests of hypotheses. In short, future research that seeks to test or extend the results presented in this book can not only use different existing data sets, but may also use different approaches given the nature of data sets that are continuously expanding.

Most of the papers presented in this collection offer various policy lessons or prescriptions. However, these are often presented in light of the immediate research findings and not integrated into a broader policy framework. This suggests that there is an opportunity for examination of broader public policy analyses. For example, a policy-oriented workshop and associated edited book or a journal special edition might be undertaken to examine the public policy issues and approaches to the impact growing aging and/or youth cohorts are having on geographic labor markets. Similarly, a focus on the evolving nature of migration and how this may impact economic performance of labor markets begs for more empirical and related policy analysis in different parts of the world.

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