

Economic development: A review of key themes in the international literature

November 2014



This paper is presented not as policy, but with a view to inform and stimulate wider debate.

Research to improve decisions and outcomes in agribusiness, resource, environmental, and social issues.

Paul Dalziel

Caroline Saunders

The Agribusiness and Economics Research Unit (AERU) operates from Lincoln University providing research expertise for a wide range of organisations. AERU research focuses on agribusiness, resource, environment and social issues.

Founded as the Agricultural Economics Research Unit in 1962 the AERU has evolved to become an independent, major source of business and economic research expertise.

The AERU has four main areas of focus: trade and environment; economic development; non-market valuation; and social research.

Research clients include government departments, both within New Zealand and from other countries, international agencies, New Zealand companies and organisations, individuals and farmers.

DISCLAIMER

While every effort has been made to ensure that the information herein is accurate, the AERU does not accept any liability for error of fact or opinion which may be present, nor for the consequences of any decision based on this information.

A summary of AERU Research Reports, beginning with #235, are available at the AERU website www.lincoln.ac.nz/aeru

Printed copies of AERU Research Reports are available from the Secretary.

Information contained in AERU Research Reports may be reproduced, providing credit is given and a copy of the reproduced text is sent to the AERU.

Contents

RESEARCH TO IMPROVE DECISIONS AND OUTCOMES IN AGRIBUSINESS, RESOURCE, ENVIRONMENTAL, AND SOCIAL ISSUES.....	I
CONTENTS	II
LIST OF FIGURES.....	III
LIST OF TABLES.....	IV
ACKNOWLEDGEMENTS	V
EXECUTIVE SUMMARY	VI
INTRODUCTION.....	VI
1. INTRODUCTION.....	1
1.1 BACKGROUND TO THIS REPORT	1
1.2 DEVELOPMENT AND GROWTH	1
1.3 REVIEW METHOD	2
1.4 STRUCTURE OF THE REPORT.....	3
2. CAPITAL INVESTMENT AND ECONOMIC DEVELOPMENT	4
2.1 THE MALTHUS THEORY TO EXPLAIN NO DEVELOPMENT	4
2.2 CAPITAL INVESTMENT	6
2.3 NEOCLASSICAL GROWTH.....	7
2.4 SPECIALISATION AND TRADE.....	11
3. INVESTMENTS IN PHYSICAL CAPITAL AND HUMAN CAPITAL.....	12
3.1 PRIVATE INVESTMENT AND PHYSICAL CAPITAL	12
3.2 PUBLIC INVESTMENT IN INFRASTRUCTURE	14
3.3 EDUCATION, HEALTH AND HUMAN CAPITAL	15
3.4 TRUST AND SOCIAL CAPITAL	16
3.5 CONCLUSION.....	16
4. ENDOGENOUS GROWTH	17
4.1 THE PROPERTIES OF KNOWLEDGE	18
4.2 THE BASIC APPROACH TO ENDOGENOUS GROWTH	19
4.3 THE IMPACT OF HUMAN CAPITAL ON AN INDIVIDUAL COUNTRY'S GROWTH	21
4.4 THE IMPACT OF RESEARCH AND DEVELOPMENT ON GROWTH	22
4.5 CONCLUSION.....	22
5. SYSTEMATIC APPROACHES TO ECONOMIC DEVELOPMENT.....	24
5.1 KRUGMAN'S THEORY OF AGGLOMERATION ECONOMICS.....	24
5.2 HETEROGENEOUS REGIONAL DEVELOPMENT MODELS.....	26
5.3 EVOLUTIONARY ECONOMICS AND PATH-DEPENDENCY.....	28
5.4 PORTER'S THEORY OF COMPETITIVE ADVANTAGE	30
5.5 SKILLING'S THEORY OF SMALL COUNTRY STRATEGIES.....	34
5.6 RESOURCE-BASED ECONOMIC DEVELOPMENT	35
5.7 FLORIDA'S THEORY OF THE CREATIVE CLASS.....	36
5.8 CONCLUSION.....	38
6. PEOPLE-BASED AND PLACE-BASED POLICIES.....	39
6.1 PEOPLE-BASED POLICIES	39
6.2 PLACE-BASED POLICIES	44
6.3 THE AUSTRALIAN DEBATE	47
6.4 CONCLUSION.....	50
CONCLUSION.....	51
REFERENCES	54
APPENDIX: LIST OF JOURNALS	54

List of Figures

Figure 1:	The Malthus explanation of no development	5
Figure 2:	Investment in physical capital	6
Figure 3:	Living standards and the capital–labour ratio	8
Figure 4:	Living standards in equilibrium	9
Figure 5:	Regional contributions to economic growth in New Zealand, 2007 to 2013	26
Figure 6:	Webb and Grant’s Economic Transformation Framework	30
Figure 7:	The determinants of national competitive advantage	31
Figure 8:	Potential Clusters in New Zealand, May 2002	33
Figure 9:	Regions of the Global Economy	34
Figure 10:	Cohesion spending in the European Union, 1989–2013	40
Figure 11:	Changes in population by territorial authority, North Island, 2006–2013	42
Figure 12:	Changes in Population by Territorial Authority, South Island, 2006–2013	43

List of Tables

Table 1: Forecast Growth Rates of Production, Working Age Population and Labour Productivity, New Zealand, 2014–2018	10
Table 2: Implications of Porter’s Theory of Competitive Advantage for New Zealand	32
Table 3: OECD policy recommendations for regional growth	46

Acknowledgements

The authors thank their research partners at the Ministry of Transport for several discussions that have influenced the contents of this report. We also grateful for comments provided by members of the project's advisory board chaired by John Yeabsley.

Executive summary

Introduction

1. This report has been commissioned by the Ministry of Transport to provide an overview of how economies can be supported to develop and grow. It focuses on how capabilities can be expanded through: investment in physical capital; investment in human capital (education); and investment in new knowledge creation and utilisation.

Capital investment and economic development

2. Sustained economic growth did not begin until the industrial revolution. Thomas Malthus (1766–1834) explained that prior to that, any economic surplus simply allowed higher population growth, keeping living standards at subsistence level. It was only when some of the economic surplus could be saved and invested in physical capital (factories, machinery, transport infrastructure and the like) that growth was possible.
3. Robert Solow and Trevor Swan independently published articles in 1956 that analysed the dynamics of economic growth when there is annual investment in physical capital and technological progress. Their research created the neoclassical growth model, which shows that economic growth is determined by just two factors: population growth and by the rate of technological progress. This means that growth in a country's living standards (that is, growth in per capita production) depends solely on its rate of technological progress.
4. Countries and enterprises that specialise in producing goods and services where they have a comparative advantage can enhance living standards since: experience means that workers become more skilled in their areas of specialisation; invention means that physical capital becomes more suited to its specialist tasks; and innovation and technological progress reduce wasted time and effort.

Investments in physical capital and human capital

5. Although only technological progress can affect long-run equilibrium per capita growth, the neoclassical growth model shows that there are a number of factors that can cause a step-wise increase in a country's average living standards. These factors include:
 - ▶ an increase in the rate of investment in new physical capital (including investment in infrastructure such as transport, energy distribution, irrigation and communication networks)
 - ▶ a decrease in the rate of depreciation in existing physical capital
 - ▶ a decrease in the rate of growth in the country's population
 - ▶ an increase in the population's human capital through higher levels of better quality education
 - ▶ an increase in the population's human capital through better health care
 - ▶ an increase in the country's social capital (including supportive social norms, strong networks, high levels of trust and the quality of its public institutions) that makes it easier for businesses and individuals to transact with each other.

6. These factors can all contribute to a country's average living standards, but do not affect its long-run rate of productivity growth. In the short term, a transition to a higher level of production per person will require a surge in growth, but the neoclassical approach predicts that the long-run per capita growth rate returns to a value determined by technological progress.

Endogenous growth

7. In the neoclassical growth model, the rate of technological progress is assumed to be constant. A new class of models has been developed by economists to understand the economic influences on technological progress. These are known as endogenous growth models and are all based on the idea that technological change is the result of producing and utilising new knowledge.
8. Knowledge has a special property that makes it a very powerful engine of economic growth compared to (for example) physical capital; namely, a piece of knowledge can be used by different people or businesses at the same time. Economists say that knowledge is non-rival in consumption. This means that if we double all of the inputs into a production function that includes labour, physical capital and knowledge, output will more than double because the knowledge is non-rival in consumption. Economists say that the resulting production function exhibits increasing returns to scale.
9. Results differ depending on the specific assumptions made in endogenous growth models, but generally this literature highlights four influences susceptible to economic policy that can contribute to a country's higher average living standards:
 - ▶ the extent to which research effort is wasted on duplication as the number of knowledge workers increases
 - ▶ the extent to which it becomes harder to produce new knowledge as the level of current knowledge increases
 - ▶ the human capital in a country's workforce that increases its capability to absorb technological developments sourced internationally
 - ▶ the proportion of the labour force that is devoted to producing new knowledge ready for utilisation in production.

Systematic approaches to economic development

10. The theories of economic development surveyed above emphasise the importance of new knowledge creation and utilisation. A number of systematic approaches have been developed internationally that can be interpreted as mechanisms for enhancing the benefits of knowledge-based economic development. This report discusses seven examples with at least some degree of support in New Zealand.

11. **Krugman's theory of agglomeration economics.** The key premise in agglomeration economics is that individuals become more productive when they are working in locations with higher and more concentrated populations. Philip McCann has argued that New Zealand is a small and extremely isolated country, with small urban centres and a low degree of export diversity, and that agglomeration economics therefore explains the country's low productivity levels compared to Australia and other OECD countries, and also explains patterns of relationships between Auckland and the rest of New Zealand.
12. **Heterogeneous regional development models.** The OECD has been particularly notable for arguing that national (or supra-national) policies should support all regions to develop by mobilising local resources to take advantage of economic opportunities. This includes fostering regional innovation systems and regional skills ecosystems. Although Auckland contributes one-third of New Zealand's economic growth, this means two-thirds comes from other regions, including 38 percent of national growth coming from outside Auckland, Wellington and Canterbury.
13. **Evolutionary economics and path-dependency.** The evolutionary economics literature emphasises the way entrepreneurs, businesses and institutions learn and make changes over time. It argues that this has less to do with equilibrium analysis and more to do with path-dependent processes. Ron Boschma writing for the OECD suggests that the long-term development of regions may depend on their ability to develop new sectors or market niches that have roots in the region's current knowledge base. In New Zealand there is an ongoing debate about how much New Zealand's economic strategy should build on past export strengths or should deliberately aim to create new strengths in other sectors.
14. **Porter's theory of competitive advantage.** Michael Porter developed a strategic approach to economic development that aims to build what he terms 'competitive advantage' by integrating four aspects of 'the Porter diamond': factor conditions; demand conditions; related and supporting industries; and first strategy, structure and rivalry. A key idea is to support the clustering of a nation's competitive industries. Porter's theories were applied to New Zealand in a major study led by Graham Crocombe and published in 1991.
15. **Skilling's theory of small country strategies.** David Skilling has argued that small economies have generally performed better than large economies, but this is not the case for New Zealand. His hypothesis is that small countries are able to develop a clear perspective on how they will compete globally and are then able to develop a consensus on coordinated investments to implement the agreed national strategy. His diagnosis for New Zealand is that New Zealand has been weak on both aspects: maintaining an outdated view of the global economy and not fully recognising that responding to the emerging global realities requires a more deliberate, strategic, comprehensive approach to policy.
16. **Resource-based economic development.** A stylised fact often accepted in the literature is that countries rich in natural resources tend to perform badly. This pattern is not universal, however, and New Zealand is recognised as a country that has escaped the so-called curse of natural

resources. The literature suggests that sound government, political, business and civil institutions are important, particularly for ensuring that the reduction in a community's natural capital (through mining or logging, for example) is offset by investments in the community's physical and human capital.

17. **Florida's theory of the creative class.** Richard Florida has argued that the key to a region's economic prosperity is its ability to attract creative people to live and work in its location. The three key attractors are: what's there (the built and natural environment); who's there (a diverse and welcoming community); and what's going on (the vibrancy of active, exciting, creative possibilities). Sir Paul Callaghan was a leader who advocated policies to make New Zealand "a place where talent wants to live".

People-based and place-based policies

18. To improve the knowledge economy, a central government can implement people-based policies and place-based policies. People-based policies aim at raising the human capital of individuals through greater or better-targeted investments in education and health. They also aim at supporting businesses wherever they are located. These policies may involve some subsidies for more remote regions, but are generally accepted for pursuing a country's economic and social goals.
19. The role of place-based policies, especially when they involve targeted attention to places that are struggling economically, are more controversial. One school of thought argues that such attention is misguided and may be counter-productive, since it would be more efficient and equitable to help people move to locations where they are most productive than to tax more productive regions to subsidise economic activity in struggling regions.
20. Another school of thought argues that place-based policies do not necessarily involve subsidies for economic activities but are an example of tailoring public services to meet the different contexts of different places. This school suggests there has been a paradigm shift so that the aim of regional development policy is to create conditions for endogenous growth based on mobilising local assets, capabilities and opportunities that are centred on local knowledge and innovation.
21. These two schools of thought can be illustrated with reference to a policy debate after the Australian government's "Commitment to Regional Australia" in 2010. One view recommended paying attention to lagging regions because they offer untapped potential for endogenous regional development. Another view recommended an exclusive focus on fast-growing regions because they have demonstrated they have the critical mass of human capital and industry to develop further. This suggests that the debate is not so much about people-based versus place-based policies, but about what portfolio of place-based policies will be most effective in meeting national efficiency and equity goals.

Conclusion

22. The conclusion returns to Amartya Sen's definition of development as "the expansion of the 'capabilities' of persons to lead the kinds of lives they value – and have reason to value". This report has highlighted three ways in which countries expand these capabilities:
- ▶ investment in physical capital
 - ▶ investment in human capital (education)
 - ▶ investment in new knowledge creation and utilisation.
23. There are sound economic reasons of efficiency and equity for the government to be involved in infrastructure investments in these three items: efficiency, because these expenditures involve at least an element of the economic theory of public goods meaning that the infrastructure would be underprovided if not subsidised from compulsory taxation; and equity, because access to physical infrastructure, quality education and modern technologies is essential for all communities and their residents to share in a country's growth of its average standard of living.
24. One of the key lessons from the literature is that there are advantages in integrating decisions about the three types of infrastructure investment. This makes 'place-based' analysis inevitable, without demanding a particular type of place-based policy. Instead, a synthesis of the systematic approaches to economic development surveyed in this report would begin with efforts to understand the different contexts of different places (including their connections to other regions nationally and globally).
25. The New Zealand public sector is an important asset for regions because of its unique ability to gather, synthesise and distribute new knowledge. This is an important public service (in both the economic and civic meanings of that term).
26. From the perspective of the international economy, New Zealand is itself an economic region, connected with varying strengths to other regions in the world. The principles for regional development can therefore be applied to New Zealand's national economic strategy. This is David Skilling's argument: as a small country New Zealand has the opportunity to develop a clear perspective on how it will compete globally and then develop a consensus on coordinated investments to implement that strategy.

1. Introduction

1.1 Background to this report

The New Zealand Government has published a summary of its broad policy direction for the transport sector over the next decade, which begins with the following overall objective (New Zealand Government, 2011, p. 3):

The government is seeking an effective, efficient, safe, secure, accessible and resilient transport system that supports the growth of our country's economy, in order to deliver greater prosperity, security and opportunities for all New Zealanders.

To deliver on that objective of supporting the growth of New Zealand's economy, three key areas have been identified for focus (*ibid.*):

- ▶ economic growth and productivity
- ▶ value for money
- ▶ road safety.

In line with the first area of focus, the AERU at Lincoln University was commissioned by the Ministry of Transport to prepare a report reviewing the economics literature on approaches to economic development. The report does not aim to consider the relationship between transport and the economy: this will take place at a subsequent stage. Instead, the purpose of the report is to provide a general readership with an overview of the major themes in research by economists on how economies can be supported to develop and grow.

1.2 Development and growth

Development and growth are not synonyms. The authors of this report generally adopt the approach taken by Amartya Sen in his influential book *Development as Freedom* (see Dalziel and Saunders, 2014). Sen argues that authentic development involves “the expansion of the ‘capabilities’ of persons to lead the kinds of lives they value – and have reason to value” (Sen, 1989, p. 18; see also Nussbaum, 2011). As a broad generalisation, the mainstream economics literature that has explored how capabilities of a population can be expanded have focused on three items:

- ▶ investment in physical capital
- ▶ investment in human capital (education)
- ▶ investment in new knowledge creation and utilisation.

This review follows that tradition. It begins in Chapter 2 with Robert Solow's (1956) article that addressed the first bullet point and which was described on its 50th anniversary as “among the most influential and revered articles in economic theory” (McAdam and Allsopp, 2007, p. 1). It then considers how that article was extended with the recognition of the importance of human capital (Chapter 3) and of endogenous technological progress through knowledge creation and utilisation (Chapter 4).

In this literature, investments in physical capital, human capital and knowledge creation are found to contribute to a country's average living standards, measured as the level of production per person, but do not generally contribute to higher economic growth rates (which are fixed by other non-economic parameters). Thus, everything else being the same, improvements in the way these investments are made should expand the capabilities of people to lead the kinds of lives they have reason to value.

It should be acknowledged, however, that this is not necessarily the case. In 2008, for example, three eminent economists, Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, were asked to head a high profile Commission to identify the limits of how economists measure economic performance and social progress. Their report reached the following "unifying theme" (Stiglitz et al., 2009, p. 12, emphasis in the original text):

Another key message, and unifying theme of the report, is that the time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people's well-being. And measures of well-being should be put in a context of sustainability.

This key message is a reminder that growth is not authentic development unless the growth is sustainable and contributes to people's wellbeing. Chapter 5 therefore considers recent literature that has built on the insights of the approaches to growth covered in chapters 2 to 4 in order to suggest how nations and regions can promote genuine development.

1.3 Review method

In order to ensure that the major themes in the economics literature have been included in this report, the AERU research team used the American Economic Association's EconLit database. It undertook a search using the phrase "economic growth" and "review", which returned 5,393 citations. The search was then restricted to journal articles published since 1 January 2000, reducing the number of citations to 4,003. The database was then asked to list the journals with the most citations, and from this list the search was restricted to journals rated A* or A by the Australian Business Deans Council. This focussed attention on high impact journals containing a good number of review articles on economic growth. This criterion was met by 16 journals, listed in Appendix A.

This procedure resulted in 628 articles. Their titles and abstracts (where available) were read. Book reviews, country studies, episode studies and tests of particular theories were excluded in order to focus on general reviews and multi-country research. This produced a final list of 83 articles that were considered for this report. All of these articles are included in the report's references, whether or not they were specifically cited in the main text.

1.4 Structure of the report

The report begins in Chapter 2 with the origins of economic development in production growth through investment in physical capital (see, for example, Hansen and Prescott, 2002). That recognition was further developed in Solow's (1956) neoclassical growth model, which highlights technological progress as the major determinant of long-run equilibrium growth of a country's per capita gross domestic product. A large number of textbooks can be consulted on this model and its empirical applications (see, for example, Jones and Vollrath, 2013); our approach is to present its main elements in a manner suitable for a non-specialist audience.

A feature of the neoclassical approach is that it identifies factors that do not affect a country's long-run growth rate, but do influence its average living standards. These factors include population growth and the proportion of output that is devoted to investment in new physical capital. Chapter 3 discusses influences on these factors. It has been recognised, for example, that the returns to private sector investment opportunities can be influenced by the level and type of public sector investment in capital infrastructure (Aschauer, 1989). It has been further recognised that forms of capital other than physical capital are also important for growth. This is particularly true of human capital investment through education (Mankiw et al., 1992) and better health (Knowles and Owen, 1995).

Chapter 4 considers influences on technological progress. These are known as endogenous growth models. Some authors (for example Jones, 1995) have argued that factors such as the number of workers specialising in producing new knowledge influence average living standards, but not long-run growth rates. Other authors (for example Young, 1998, and Howitt, 1999) argue that the share of the labour force engaged in producing new knowledge has a positive impact on the economy's long-run equilibrium growth rate.

A number of specific systematic approaches have been taken to understanding how countries can foster better economic performance. Chapter 5 presents a précis of seven important examples where there has been a specific application to New Zealand: Krugman's theory of agglomeration economics; heterogeneous regional development; evolutionary economics and path-dependency; Porter's theory of competitive advantage; Skilling's theory of small country strategies; resource-based economic development; and Florida's theory of the creative class.

Chapter 6 discusses how central government policies to expand 'the knowledge economy' can focus on the knowledge-based productivity of individuals (*people-based policies*) and on the knowledge-based productivity of particular communities and regions (*place-based policies*). The importance of people-based policies is universally accepted, but different countries at different times have put different levels of emphasis on place-based policies. The chapter explains the two types of policy and then considers two influential reports published in Australia in 2010/11 that arrived at opposite conclusions about the nature and value of people-based policies in the Australian context.

Chapter 7 finishes the report with a brief conclusion.

2. Capital investment and economic development

Before the late eighteenth century, there was virtually no change in the material living standards of the vast majority of the human race. Sustained economic growth affecting whole populations did not begin until the industrial revolution. This chapter describes the standard economic analysis of why humans remained at a subsistence standard of living for so long and how that pattern changed when communities began to invest their surplus into physical capital. The analysis of no growth was introduced by Thomas Malthus (1766–1834), which led to the epithet describing economics as “the dismal science”. The Malthus model of no growth is presented in Section 2.1. Section 2.2 then uses the same model to analyse the change when capital investment is possible.

In 1956, two economists independently published papers that aimed to explain how a country’s rate of economic growth is influenced by its rate of population growth, its rate of investment in new capital as a proportion of total output, and its rate of technological progress. The resulting model is sometimes called the Swan-Solow model after the two authors, sometimes just the Solow model (see Solow, 2007, for an interesting reflection on this point), and sometimes the neoclassical growth model. The original analysis and empirical testing have been extended in many ways, some of which will be considered in Chapter 3, but its basic idea remains the core of economics understandings of economic growth; it is therefore discussed in section 2.3.

The chapter finishes with a discussion of specialisation and trade. These two concepts have been at the heart of economics since Adam Smith founded the discipline with his *An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776. They are vitally important for a small trading nation like New Zealand. Section 2.4 therefore links specialisation and trade to the three core elements in the neoclassical approach.

2.1 The Malthus theory to explain no development

The Malthus explanation of no development is based on three observations. First, as population increases, the amount of production needed to feed, clothe and shelter the population increases at the same rate. Second, the level of production also increases with population growth but at a diminishing rate since the amount of available land is fixed. Third, if in a given year there is a surplus of production beyond what is needed for subsistence (due, for example, to unusually favourable weather conditions), the population would tend to increase. This is because the extra food means new-born babies would be more likely to survive and elderly members of the population would be more resistant to illness. The opposite would happen if there were food shortages due to factors such as drought or storm damage.

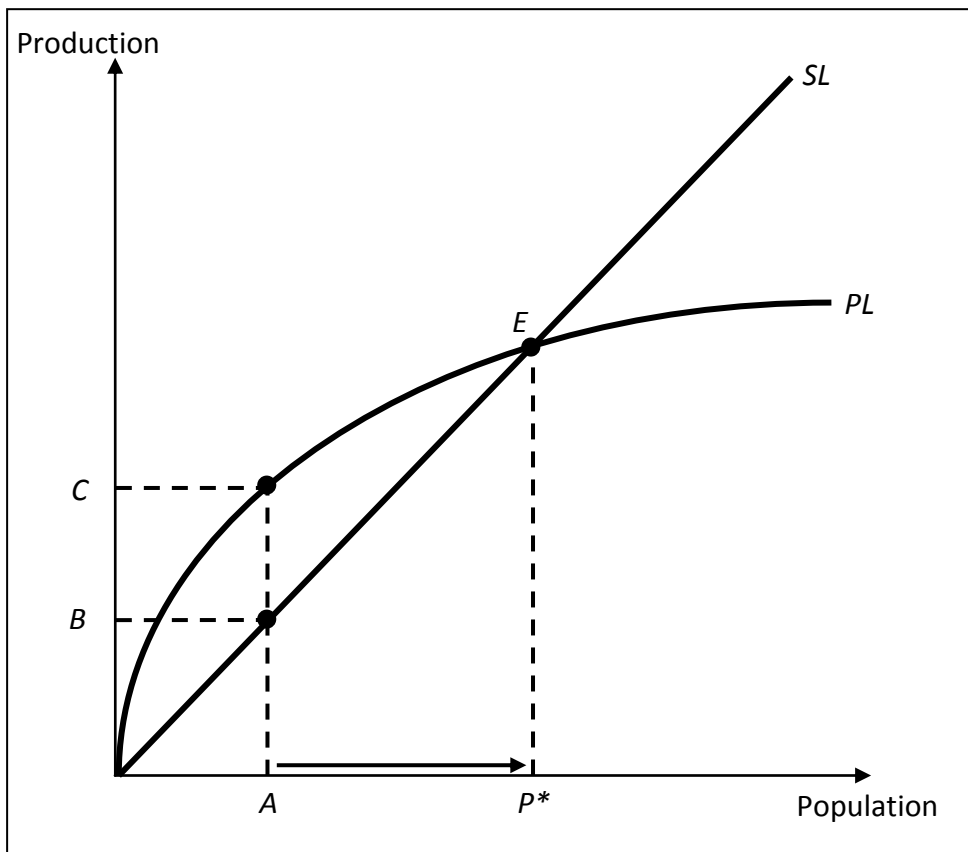


Figure 1: The Malthus explanation of no development

Figure 1 presents the Malthus explanation in a diagram taken from Taylor and Dalziel (2002, Chapter 9). The horizontal axis of the figure measures the country's population and the vertical axis measures quantity of production. The two lines in the diagram are based on the first and second observation made by Malthus.

Thus the straight line, labelled *SL* for subsistence line, comes from the first observation. As the size of the population increases along the horizontal axis, the amount of production needed to feed, clothe and shelter that population increases along the vertical axis. The relationship is assumed to be a straight line because each extra person requires (on average) as much food, clothing and shelter as any other person in the population.

The curved line, *PL* for production line, represents Malthus's second observation. As the size of the population increases, production increases at a diminishing rate because of constraints such as the amount of available land. Hence the relationship is a curve as shown.

The two lines intersect at point *E*, which shows the level of population on the horizontal axis at which production on the vertical axis exactly equals the amount needed for subsistence. This is the Malthusian level of equilibrium population, labelled P^* on the horizontal axis. It is called equilibrium because of the third observation, that population changes when there is a surplus or deficit of production relative to the subsistence level.

This is also shown in Figure 1. Suppose the population is at level *A* shown on the horizontal axis, lying

below P^* . The amount of production needed to sustain that population is at point B on the vertical axis, but the amount of output being produced is at point C . Thus, the existing population experiences a year in which there is a surplus of production beyond what is needed for subsistence. Under these circumstances, Malthus argued that the population would increase since the plentiful food means that infants would be more likely to survive and the elderly less likely to die. Population growth is represented by a movement along the horizontal axis to the right (shown by the arrow). This reduces the size of the surplus until the community reaches its equilibrium population at P^* , living at a subsistence level of material consumption.

2.2 Capital investment

The industrial revolution offered an alternative scenario to this dismal diagnosis, which is shown in Figure 2. Begin with the original production line labelled PL and again assume an initial situation where there is surplus production; that is, let the population be at point A , generating a surplus equal to the distance BC . Instead of allowing that surplus to increase population, however, suppose at least some of the surplus production is *saved* and *invested* in the production of physical capital such as factories, machinery, transport infrastructure and the like.

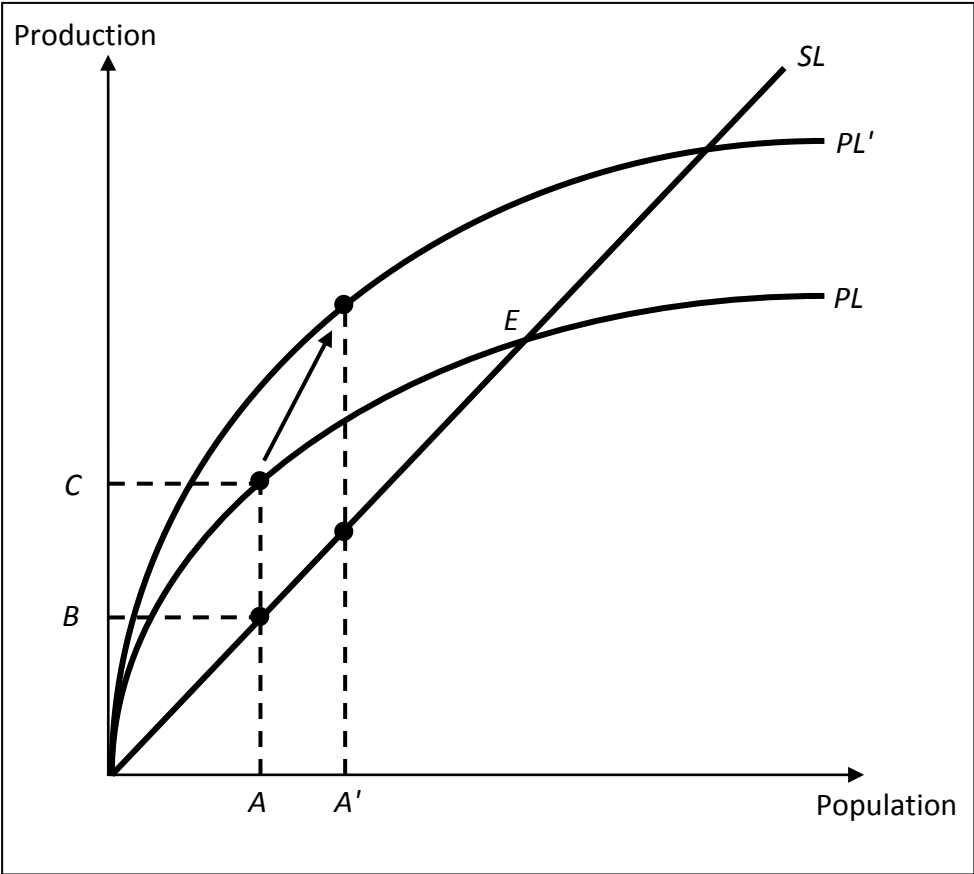


Figure 2: Investment in physical capital

The impact of the new physical capital is that any population of a particular size is able to produce more than was possible before the investment. This means that the entire PL line shifts upwards to become the new relationship between population and production shown as PL' . Even if we allow for some population growth (for example, from A to A' on the horizontal axis), the surplus can grow over time as the increasing stock of physical capital raises the output that can be produced by each worker. The growing surplus means investment in physical capital can be maintained at the same time as the population's living standards increase above subsistence, and the first step towards sustainable development has taken place.

This development turns attention to a new concept; namely, the amount of capital per worker, or more generally the capital–labour ratio. An economy that has a higher capital–labour ratio, everything else being the same, will have a higher material standard of living because its workers will be more productive.

Further, not only does the stock of physical capital increase over time, but its quality also improves as a result of incorporating new technologies. Thus, *technological progress* causes the PL curve in Figure 2 to shift upwards at a faster rate, expanding the population's opportunities for sustainable development and higher living standards.

2.3 Neoclassical growth

Robert Solow (1956) and Trevor Swan (1956) presented an explanation of growth that paid attention to an economy's capital–labour ratio and its rate of technological progress. This section will not present the mathematics (see, for example, Chapter 2 of Jones and Vollrath, 2013), but will aim to explain the core elements of the explanation that produce its significant results.

The neoclassical growth model begins with the idea that economic production depends on the economy's current level of capital stock and its current population of workers.¹ We are interested in living standards, meaning that we are interested in the amount of *production per worker*, which we assume depends on the amount of capital per worker.² Again, because the amount of land is fixed, an increase in the capital–labour ratio is associated with a higher level of production per worker, but the increase occurs at a diminishing rate.

Figure 3 shows the resulting relationship. It has a similar shape to the production line in Figure 1, but this curve has different axes; it is showing the average living standards in the economy (that is, output per worker) and a function of the capital–labour ratio.

1 For readers who are familiar with the mathematical notation, let output be denoted as Y , the capital stock as K , and the population of workers as L . Then $Y = F(K, L)$, where $F(\cdot)$ is the aggregate production function assumed to satisfy certain mathematical properties such as output increases at a diminishing rate as either K or L increases, holding the other factor constant.

2 Let production per worker be denoted as $y = Y/L$, and capital per workers as $k = K/L$. Then if the production function is homogenous of degree 1 with respect to its two inputs, we can write $Y/L = F(K/L, L/L)$ or $y = F(k, 1)$. This transformation means that an increase in the capital–labour ratio leads to an increase in production per worker, but again at a diminishing rate.

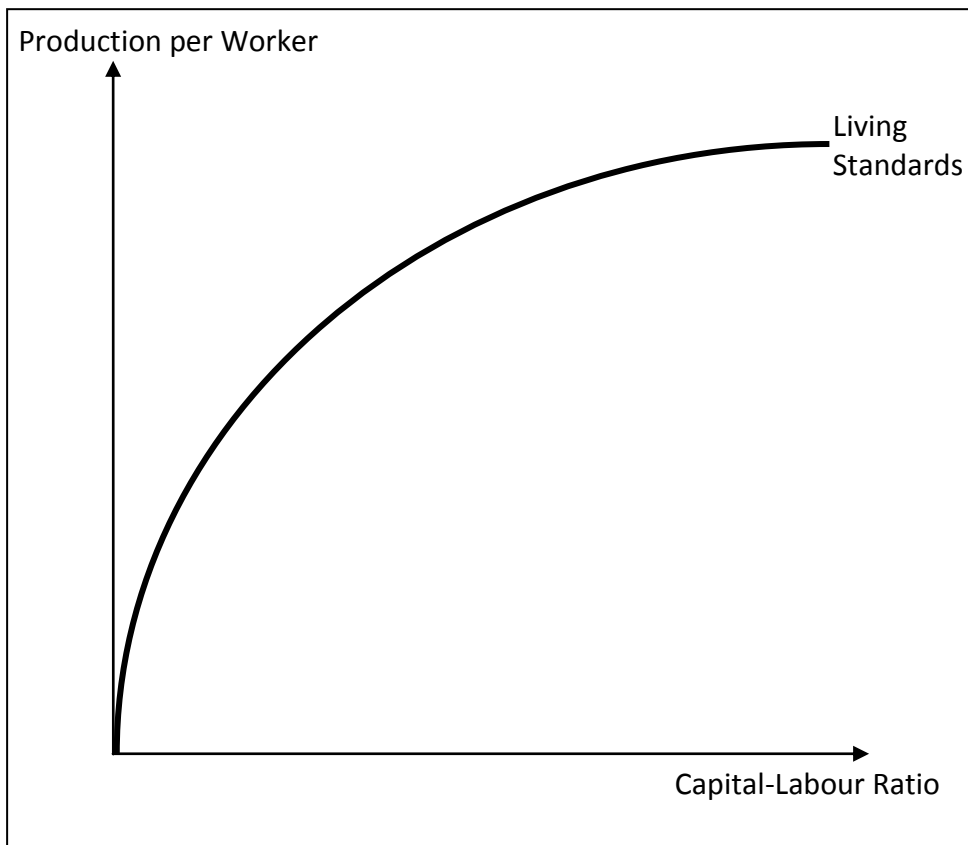


Figure 3: Living standards and the capital–labour ratio

The next question to ask is what determines the economy’s capital–labour ratio. Suppose the economy’s capital–labour ratio is currently at some level, which might be written as k_0 . Ignoring technological progress for the moment, three factors cause this ratio to change:

1. A proportion of the production each year is saved and invested in new capital stock, which will cause the capital–labour ratio to increase; this is termed the investment rate, traditionally denoted s (for ‘savings’).
2. Some of the existing capital stock wears out and can no longer be used for production, which will cause the capital–labour ratio to decrease; the rate at which capital wears out is termed the depreciation rate, denoted d .
3. The number of workers is growing, which means the existing capital stock will be shared by more workers, which will cause the capital–labour ratio to decrease; the population growth rate is denoted n .

Robert Solow showed that the outcome of these three factors can be shown simply, which is done in Figure 4 using the notation explained in footnote 2. The first of the three factors is shown in the curved line, $s.F(k, 1)$, showing the proportion of current production per worker that is saved and invested. The straight line, $(d + n)k$, shows the second and third of the three factors. It is easily shown that the economy eventually settles in equilibrium at point E , where the two lines intersect. This determines the economy’s capital–labour ratio, k^* , and hence its level of average living standards, y^* .

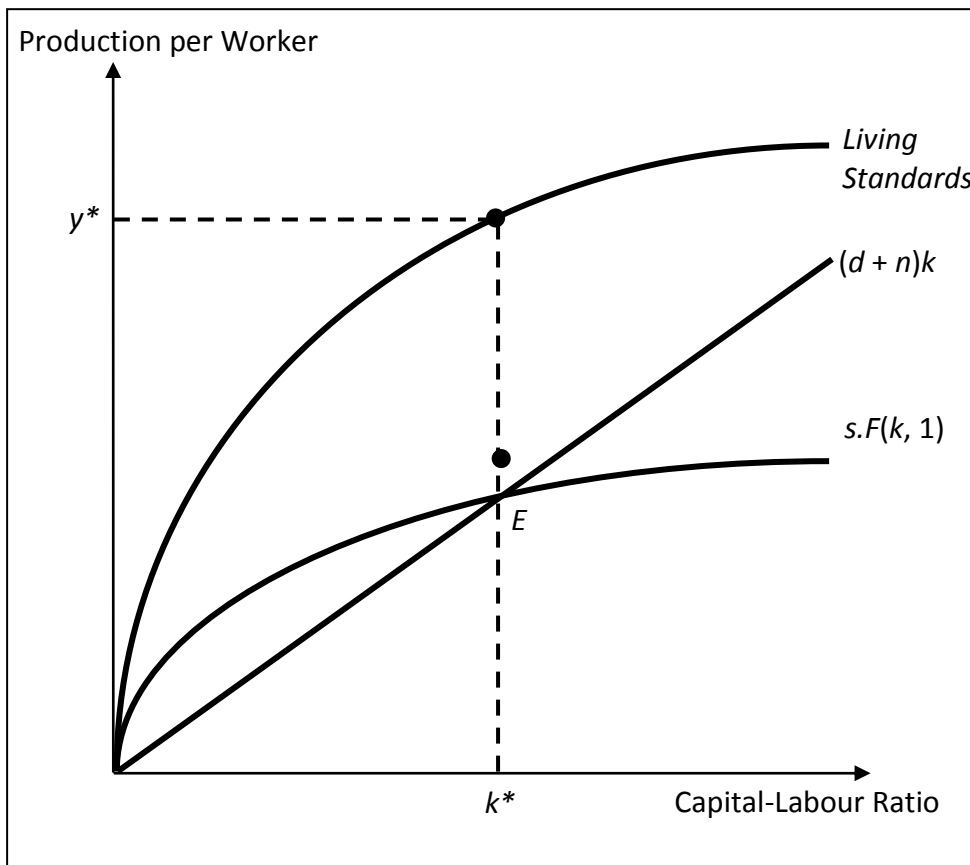


Figure 4: Living standards in equilibrium

From these simple assumptions, some strong conclusions are easily derived:

- ▶ The economy settles on a steady rate of growth in production that equals the rate of growth in the economy's population, n .
- ▶ The level of investment in new capital is just the amount needed to offset the impacts of the depreciation rate, d , and the population growth rate, n .
- ▶ Consequently, the amount of capital available to each worker remains constant over time, (k^* in Figure 4).
- ▶ Hence, the amount of production per worker also remains constant over time at a fixed level, (y^* in Figure 4) that depends positively on s and negatively on d and n .
- ▶ This means a country will tend to have higher level of production per capita, everything else being the same, if it increases its investment rate or lowers either its depreciation rate or its rate of population growth.

The next step is to recognise technological progress. The simplest way to introduce this is to assume that the labour force becomes more productive over time at a constant rate. This means that the two curved lines in Figure 4 move upwards as new technologies are introduced. More sophisticated assumptions have been made since Solow's initial paper, including exploring the impact of better education and health on labour productivity (see the following chapter), but they do not change the fundamental results of the neoclassical model; namely, allowing technological progress means that the first bullet point in the above list is replaced with the following conclusion:

- ▶ The economy settles on a steady rate of growth in production that equals the rate of growth in the economy's population, n , plus the rate of growth in its labour productivity.

This is illustrated in Table 1, which presents New Zealand data forecast by the New Zealand Treasury as part of the 2014 Budget. In the short term, production can grow faster than the sum of population growth and labour productivity growth, and indeed Treasury forecast that real GDP would grow faster than these figures would justify in 2014 and 2015. Eventually, however, the economy was forecast to settle on a steady rate of growth (2.1 percent per annum) that equalled the rate of growth in the working age population (1.0 percent per annum) plus the growth in labour productivity (1.1 percent per annum) in line with the neoclassical growth model.

Table 1: Forecast growth rates of production, working age population and labour productivity, New Zealand, 2014–2018

Years Ending March	Forecast Growth (Annual Average Percentage Change)		
	Production (Real GDP)	Working Age Population	Labour Productivity (Hours Worked Basis)
2014	3.0	1.2	1.4
2015	4.0	1.6	1.3
2016	3.0	1.4	1.5
2017	2.1	1.1	1.1
2018	2.1	1.0	1.1

Source: Treasury (2014, Table 4, p. 6).

It is also easy to show (see, for example, Jones and Vollrath, 2013, section 2.2) that the introduction of technology means that in equilibrium the level of production per worker and the level of capital per worker both grow at the rate of technological progress. Thus the neoclassical growth model reaches two powerful conclusions:

- ▶ A country will tend to have higher output per capita, everything else being the same, if it increases its investment rate or lowers either its depreciation rate or its rate of population growth.
- ▶ A country's living standards (production per capita) will grow faster, everything else being the same, if the country increases the growth of its labour productivity (technological progress).

2.4 Specialisation and trade

The modern discipline of economics was founded by Adam Smith when he published *An Enquiry into the Nature and Causes of the Wealth of Nations* in 1776 (see, for example, Phillipson, 2010). In his opening chapter, Smith explained that a key cause of rising wealth in a nation was the ability for producers to take advantage of specialisation. He gave the example of a producer of pins, creating a system of specialised operations (Smith, 1776, Volume 1, p. 8):

One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations...

Smith observed that this specialised system allowed ten people to make upwards of 48,000 pins a day, whereas each one of the ten acting on his own could make perhaps only 20 pins in a day at best. This system was possible because producers could trade their specialised outputs to other producers and to consumers for their market price.

This idea was extended to nations by David Ricardo in his 1817 book, *On the Principles of Political Economy and Taxation*. Ricardo demonstrated that if two countries specialised in the product in which they had a comparative advantage in production, and then traded the products with each other, both countries would end up better off. The extent to which a country is open to international trade is still recognised as a major contributor to the average standard of living enjoyed by its citizens (see, for example, Wacziarg and Welch, 2008, and Ramondo and Rodriguez-Clare, 2010).

Adam Smith recognised that specialisation would lead to further benefits over time, as he explained in the following terms (Smith, 1776, Volume 1, p. 11):

This great increase of the quantity of work which, in consequence of the division of labour, the same number of people are capable of performing, is owing to three different circumstances: first, to the increase of dexterity in every particular workman; secondly, to the saving of the time that is commonly lost in passing from one species of work to another; and lastly, to the invention of a great number of machines which facilitate and abridge labour, and enable one man to do the work of many.

These “three different circumstances” cited by Adam Smith can be connected to the three central elements of the neoclassical growth model: population; investment in physical capital; and technological progress. Over time, countries and enterprises that specialise in producing goods and services where they have a comparative advantage can increase their output levels because:

- ▶ experience means that workers become more skilled in their areas of specialisation
- ▶ invention means that physical capital becomes more suited to its specialist tasks
- ▶ innovation and technological progress reduce wasted time and effort.

Chapter 3 explores how the simple neoclassical model has been extended to include factors such as these in explaining why different countries might experience different standards of living.

3. Investments in physical capital and human capital

The neoclassical growth approach emphasises a small number of parameters such as a country's rate of investment, the rate of its capital stock's depreciation, its population growth rate and the rate of technological progress raising labour productivity. This chapter focuses on simple extensions concerning the first three parameters, all of which affect the *level* of a country's living standards. The fourth parameter of technological progress (which can affect the economy's *growth rate*) will be considered in Chapter 4.

The chapter starts with factors influencing a country's rate of investment and rate of capital stock depreciation. Most investment decisions are made by private individuals and enterprises, which suggests that public policy should aim to provide an environment that supports quality investment decisions. Section 3.1 explains some implications of this idea. Some types of physical capital investment, however, typically involve the public sector to overcome what would otherwise be a market failure in their provision. This is the case for what is generally termed as infrastructure investment, which is discussed in section 3.2.

The chapter does not discuss population growth rates *per se* (see, for example, Dalgaard and Strulik, 2013) but examines the suggestion that it is not simply a country's rate of population growth that is significant; the quality of a country's workforce is also relevant. Thus a higher level of investment made in education will typically raise the 'human capital' available for production, and so will increase living standards. This idea is discussed in section 3.3. A related idea is that a country is able to organise more production per person if the population has a high level of 'social capital' that means people are able to trust each other as well as fundamental social institutions such as the rule of law. This idea is discussed in section 3.4.

3.1 Private investment and physical capital

As described in the previous chapter, it is the possibility of investment in physical capital that lifts a population above a subsistence existence. In the neoclassical growth approach, a higher share of economic activity devoted to the production of physical capital does not increase the economy's equilibrium growth rate, but it does raise the level of capital per worker and consequently the level of output per person. Thus a high investment economy will enjoy higher living standards, everything else being the same, than a low investment economy.³

Most investment expenditure in modern capital economies is undertaken by private enterprise; hence the economics literature has included a strong focus on the importance of maintaining a macroeconomic environment that supports both the quantity and quality of investment decisions. An example is the Policy Framework for Investment published by the OECD (2006b), which emphasises fundamental principles such as the rule of law (including protection of property rights), transparency and non-discrimination.

³ The idea is not pursued here, but since the publication of *The General Theory of Employment, Interest and Money* by John Maynard Keynes (1936), economists have also understood that high levels of investment are also important for maintaining full employment.

Its chapters cover:

- a. investment policy
- b. investment promotion and facilitation
- c. trade policy
- d. competition policy
- e. tax policy
- f. corporate governance
- g. policies for promoting responsible business conduct
- h. human resource development policy
- i. infrastructure and financial sector development
- j. public governance.

New Zealand is highly regarded for the quality of its investment policy environment; the OECD, for example, observed in 2003 that New Zealand is “a country that seems close to best practice in most of the policies that are regarded as the key drivers of growth” (cited by McCann, 2009, p. 279). Philip McCann himself comments that “the quality of New Zealand’s institutions is second to none” (*idem*, p. 288).

A common concern in New Zealand is whether investment in New Zealand is constrained by inadequate savings or by too high a portion of savings being misdirected into residential housing. The Savings Working Group set up by the Minister of Finance, for example, began its final report with the following warning (SWG, 2011, p. 6):

New Zealanders – the people and the government – are not saving enough. Unless we make some rapid changes, we are risking a major economic disruption likely to leave practically all New Zealanders worse off. It’s as if we are standing on top of a cliff that may collapse dramatically or crumble slowly. Either way, it would be a bad fall. We need to move back from the brink – and fast.

Concerns about the level of saving in New Zealand are not universally held; Le, Scobie and Gibson (2009, p. 3), for example, reported from their study of data from the Survey of Family, Income and Employment that “most of the population aged 45–64 has made adequate provision” of savings for retirement, meaning that they can expect to maintain their pre-retirement level of consumption expenditure following retirement.

A number of authors have suggested that the lack of a capital gains tax or a relatively high level of immigration (see Reddell, 2013) may contribute to a high level of national savings being devoted to residential housing rather than to business investment. Grimes (2009, p. 6), however, finds “no indication that excessive housing investment has crowded out infrastructure investment”, while “New Zealand’s plant and machinery investment has been well above the OECD median for almost the entire 1970–2005 period”.

3.2 Public investment in infrastructure

Although most investment in physical capital is undertaken in the private sector, the public sector typically undertakes a dominant role in funding (and perhaps providing) investment in a particular type of physical capital known as infrastructure.⁴ Infrastructure is defined as follows (National Infrastructure Unit, 2011, p. 1):

'Infrastructure' is the fixed, long-lived structures that facilitate the production of goods and services and underpin many aspects of quality of life. 'Infrastructure' refers to physical networks, principally transport, water, energy and communications.

Examples include: roads; railways (metro and national); airports; seaports; urban water networks; rural irrigation schemes; electricity generation; electricity transmission; oil and gas distribution; and telecommunications, including high-speed and high-capacity broadband in urban and rural communities. There is private provision in most of these categories, but there are important reasons why central government often plays a dominant role in funding at least some forms of infrastructure investment.

It may not be feasible, for example, for a private supplier to collect revenue directly from users to cover costs. Privately operated toll roads can be created, for example, but the experience in Australia includes examples where the operators have suffered substantial losses as well as other examples of successful private toll roads.

Alternatively, there may be room in the market for only one supplier. A good example is the national grid for electricity transmission. A second national grid would be enormously wasteful and so care must be taken to ensure that the owner is not allowed to take advantage of its monopoly position to raise prices.

Further, financial returns to a project may depend on other infrastructure investments and on how people choose to use the infrastructure. Infrastructure investment creates 'options' that may or may not be taken up (see, for example, Grimes, 2010 and 2013). These options have economic value that can be estimated, but they will not normally generate a profit flow to private suppliers without public subsidies.

Since at least Aschauer (1989), the literature has suggested that sound public investment in infrastructure can raise the rate of return to private investment in physical capital, and so stimulate a greater increase in productivity than other forms of public expenditure. Aschauer argued that a decline in public infrastructure investment in the United States after 1970 was a contributor to a fall-off in productivity growth in that country, at about the same time (*idem*, pp. 194–197). A review by Gramlich (1994) found the evidence for inadequate public investment to be mixed and made the point that the quality of investment is vitally important. More recently, however, Crescenzi and Rodríguez-Pose (2012, p. 505 and 508) has presented evidence that “the impact of transport infrastructure endowment on regional growth is well below what could be expected from its prominent role in regional development strategies in the EU”.

⁴ This section draws on Chapter 5 in Dalziel and Saunders (2014).

3.3 Education, health and human capital

Not all workers are equally productive; hence an obvious extension is to incorporate the education level of a country's workforce. An early influential paper to do this was by Gregory Mankiw, David Romer and David Weil (1992). Their extension did not change Solow's basic result that per capita production grows at the rate of technological progress, but it did predict that countries with a more highly educated workforce would have a higher level of per capita income (Jones and Vollrath, 2013, p. 57; see also Sianesi and Van Reenen, 2003, for a general survey).⁵

Education is not costless. People who choose to stay in education for longer must forego income they could have earned in employment, which is reflected in a lower level of production due to their absence from the workforce. This sacrifice of consumption is analogous to the sacrifice of current consumption when some of a country's annual production is devoted to investment in physical capital. Noting this similarity, Jacob Mincer (1958), Theodore Shultz (1961) and Gary Becker (1962, 1964) described the education decision as investment in human capital.

The human capital concept has been very influential in public policy, leading to conscious efforts to increase the amount of time young people spend in school. An article by Blankenau et al. (2007) uses data from 23 developed countries to show that public expenditure on education has positive economic impacts, noting also that these impacts are offset by the negative impact of the taxation needed to finance the public spending.

There has been some criticism of the practice of using 'length of time in education' as a measure of human capital, since it is arguably the quality of education in developing labour market skills that really matters (Wolf, 2004; Dalziel, 2014). Hanushek and Kimko (2000) use data on international mathematics and science test scores as a more direct measure of labour force quality, focusing on cognitive skills. They conclude that "labor-force quality has a consistent, stable, and strong relationship with economic growth" (p. 1203). That finding was confirmed in the later review article by Hanushek and Woessmann (2008), although Breton (2011) disputes their analysis and argues that average schooling attainment has greater statistical significance than average test scores.

A New Zealand contribution to this literature was made by Stephen Knowles and Dorian Owen (1995) at the University of Otago. They commented that human capital is comprised of education *and health*. They therefore used life expectancy as a proxy for the stock of health capital and found a strong and relatively robust relationship between this proxy and income per capita; indeed, they suggested that this relationship was more robust than the relationship between per capita income and educational human capital.

⁵ There are models in which higher education levels lead to an increase in economic growth. These models depend on spillover effects arising from education, which will be discussed in Chapter 4.

3.4 Trust and social capital

Workers do not live in isolation, so the productivity of their acquired skills can be influenced by their social environment. Rogers (2008), for example, finds evidence in an econometric study of data from a range of developing countries that the economic impact of schooling tends to be weaker if a country has higher levels of corruption, larger black market premiums or a greater 'brain drain' to the United States. Gradstein and Justman (2002), on the other hand, argue that one of the key contributions of education to economic growth is the way in which it can increase social cohesion within a society.

More generally, a country's economic potential can be affected by its social capital. This reflects the idea that a community that has supportive social norms, strong networks and high levels of trust among its citizens finds it easier to undertake market transactions and so achieve economic prosperity. Influential books exploring this idea were by Putnam et al. (1993), Fukuyama (1995) and Putnam (2000). Key academic contributions were James Coleman's (1986) article on social capital in the creation of human capital and Douglas North's (1987) article on institutions, transaction costs and economic growth.

A fundamental requirement is a trusted legal system for ensuring that property rights are properly defined and protected (see, for example, De Soto, 2000). A review of recent research on the role of legal rules in economic growth, particularly its origins in the emergence of common law, is provided by Xu (2011). Empirical support for the importance of trust is provided by Algan and Cahuc (2010).

It is possible to include the quality of a wide range of public institutions as determinants of economic growth (Roderik et al., 2004). This includes institutions for maintaining stable macroeconomic policies. Numerous studies have produced empirical evidence that macroeconomic instability can have a strongly negative impact on a country's rate of economic growth; see, for example, Sirimaneetham and Temple, 2009, and Fatas and Mihov, 2013.

3.5 Conclusion

The factors considered in this chapter can all contribute to a country's productivity or average living standards (measured as production per person), but do not affect its long-run rate of economic growth. In the short term, a transition to a higher level of production per person will require a surge in growth, but the neoclassical approach predicts that the long-run per capita growth rate will return to a value determined by technological progress.

This last observation has led economists to explore the factors that determine technological progress; the following chapter begins to examine that literature with a discussion of what have become known as 'endogenous growth'.

4. Endogenous growth

The literature surveyed in the previous two chapters has concluded that long-term economic growth depends on two factors: population growth and technological progress. In that literature, both factors were treated as exogenous; that is, determined outside the economic system. However, as Romer (1994, p. 12) observed, “no economist ... has ever been willing to make a serious defense of the proposition that technological change is literally a function of elapsed calendar time”. Instead, Romer (1986, 1990) introduced the idea that technological progress is the result of intentional activity to produce new knowledge. The resulting explanation is therefore called endogenous growth because technological change is determined inside the relevant model.

Section 4.1 discusses some properties of knowledge that distinguish it from other goods produced by people motivated by market signals. In particular, knowledge is said by economists to be non-rival in consumption and only partially excludable. These properties mean that new knowledge is potentially very valuable to society but not profitable to produce unless there are legal protections for intellectual property. Further, if knowledge is an input into production, it means that production involves “increasing returns to scale”.

Section 4.2 then explains how a theory of knowledge production can be incorporated into the neoclassical growth approach. The explanation is based on Romer (1990) and Jones (1995a) as presented in Chapter 5 of Jones and Vollrath (2013). There is a subtle difference in the two modelling strategies which nevertheless leads to radically different conclusions: Romer’s approach allows per capita output growth to be influenced by the size of the workforce specialising in producing new knowledge, but the assumption made by Jones means that this item again affects the *level* of per capita output but not its long-run *growth*.

Section 4.3 returns to a theme in the previous chapter: the role of human capital in raising a country’s living standards. This is discussed in the context of global economic growth in new knowledge determined by the approach explained in section 4.2, but an individual country’s capability to utilise that knowledge depends on the skills of its labour force.

Section 4.4 represents a departure from the standard results discussed so far in this report, which have generally held that the long-run, steady-state growth rate is independent of economic variables. A new generation of endogenous growth models has been developed to argue that Romer’s (1990) original approach can be modified in a way that meets the critique of Jones (1995a), but finds that the long-run growth rate is influenced positively by the proportion of the labour force (but not its size) devoted to producing new knowledge.

The chapter finishes with a brief conclusion in section 4.5.

4.1 The properties of knowledge

Endogenous growth explanations adopt the idea that technological progress comes about through the production and utilisation of new knowledge. The following section will summarise how this process of production and utilisation may be understood, but first some comment needs to be made about two special characteristics of knowledge itself (see Blakely et al., 2005, for a discussion on this in a New Zealand context).

The obvious contrast is with physical capital, the original factor identified with economic growth. Suppose that an enterprise produces a new piece of capital equipment such as a passenger airplane. Two characteristics of the airplane are typical of economic goods:

1. At any point in time, the airplane can be used to fly only one route; it cannot be used to fly from Auckland to Singapore and simultaneously fly from London to Los Angeles.
2. The owner airline can determine who is permitted to be a passenger on the airplane for any flight and under what circumstances, including setting the fare for the journey.

In the technical language of economists, the airplane has the properties of 'rivalry in consumption' (if it is used to provide services to passengers wanting to fly from Auckland to Singapore, it cannot be used at the same time to provide services wanting to fly from London to Los Angeles) and of 'excludability' (the owners can prevent potential consumers from using the service unless the consumers pay the set fares).

Goods that have these typical characteristics are termed 'private goods'. Generally speaking, competitive markets ensure that these goods are efficiently produced and consumed in the sense that no resources are wasted and there are dynamic incentives to encourage industry innovation for adding greater value to consumers.

Knowledge, however, does not have these typical characteristics. The knowledge needed to fly an airplane can be used by a pilot travelling from Auckland to Singapore at exactly the same time that another pilot is using the same knowledge to travel from London to Los Angeles. Knowledge about basic health and nutrition can be used by billions of people simultaneously around the world.

This property makes knowledge extremely powerful for improving people's wellbeing. Because it is non-rival in consumption, it can be used by anyone without preventing any other person from using it at the same time.

Knowledge is also generally non-excludable, or at least it would be if there were not special intellectual property laws addressing this feature. In some cases it may be possible to keep an idea secret, but more often it is a relatively simple matter for other people to observe an idea put into practice or to reverse engineer a technology to understand how it operates.⁶

⁶ Some authors have argued that the spillover of knowledge from its original source to other users should not be taken for granted. Audretsch (2007, p. 65), for example, argues that "by serving as a conduit for knowledge spillovers, entrepreneurship is the missing link between investments in new knowledge and economic growth".

This second property severely weakens the incentives for the production of new knowledge. It might cost large sums of money to undertake research and develop a new idea into a commercial product, but these costs will not be recouped if others are permitted to copy the idea (without incurring the research and development costs) and sell the same commercial product to consumers at a cheaper price.

Taken together, these two properties mean that new knowledge is potentially valuable to society but not profitable for anyone to produce. To address this conundrum, laws have been developed for defining and protecting intellectual property in the form of copyright and patents. These allow a producer to place on public record new knowledge in return for the legal right for a fixed period to be able to exclude others from using that new knowledge except on terms set by the producer. There is an ongoing controversy about the appropriate length of the fixed period, trying to balance the incentive effect to produce new knowledge with the benefits of making knowledge as widely accessible as possible.

If knowledge is an input into production, it means that production involves “increasing returns to scale”. Consider first a production process in which the only inputs are labour and physical capital. This might be a factory with certain machinery and low skilled workers. If another factory was built with the same combination of machinery and workers, it might produce the same amount of output. In this example, production involves “constant returns to scale”; that is, doubling all of the inputs has led to a doubling of produced output.

Now consider a production process with three inputs: labour, capital and knowledge. Because knowledge is non-rival in consumption, it is possible to double output by doubling the inputs of labour and capital *without* doubling the level of knowledge. Expressing this another way, if we double all of the inputs (that is, if we double the level of knowledge as well as double the amounts of labour and capital), output will more than double and so economists say production involves “increasing returns to scale”.

It turns out that these special properties of knowledge have important implications for understanding equilibrium trends in living standards and economic growth.

4.2 The basic approach to endogenous growth

As in section 2.3, we start with the idea that economic production depends on the current level of capital stock and its current population of workers. Again as in section 2.3, the capital stock grows as a result of investment out of current production (after allowing for depreciation) and the population of workers grows at an exogenous rate denoted n . The difference, however, is that the productivity of these workers is not assumed to grow at some fixed and exogenous rate. Instead, worker productivity is assumed to depend on the level of knowledge at any particular moment.⁷

Further, growth in the level of knowledge depends on two factors. First, new knowledge is produced

⁷ For readers familiar with mathematical notation, let output be denoted as Y , the capital stock as K , and the population of workers as L . Chapter 2 assumed that $Y = F(K, L)$. In this chapter, some workers specialise in creating new knowledge, so that only LY workers are available to produce output. Further, the productivity of those workers is assumed to increase as the level of knowledge, denoted A , increases. Hence the production function becomes $Y = F(K, ALY)$.

by specialists who are therefore not available to produce other goods and services. Thus the total population, denoted as L , is divided between workers who produce knowledge, written L_A , and workers who produce other output, written L_Y . As more workers become specialists in producing knowledge, greater amounts of new knowledge are created (although perhaps at a diminishing rate if a greater number of knowledge workers leads to more wasteful duplication of effort).

Second, the amount of *new* knowledge created depends on the *current* knowledge already achieved. This assumption is possible because of the property that knowledge is non-rival in consumption, which means that all existing knowledge can be used by all knowledge workers in the production of new knowledge.

The exact nature of this relationship between new knowledge and existing knowledge turns out to be crucial. Romer (1990) assumed that the new knowledge created at each moment is proportional to existing knowledge, with the proportion dependent on the number of workers engaged in producing knowledge, L_A (see also Aghion and Howitt, 1998). This assumption means mathematically that the *growth* rate of knowledge, which sets the per capita economic growth rate, can be permanently increased by policies that encourage a greater number of knowledge workers, giving large countries a big advantage.⁸

Jones (1995a) argued that this result is not supported by empirical evidence; there have been big increases in the number of researchers in the world without comparable increases in per capita economic growth rates. This argument has been persuasive; Ang and Madsen (2011, p. 1360), for example, comment that:

Following Jones's (1995b) critique of the predictions of the first-generation endogenous growth models of Romer (1990) and Aghion and Howitt (1992), a positive relationship between the levels of R&D and productivity growth is generally no longer accepted as an empirical regularity in the growth literature.

Jones argued for an alternative approach in which it becomes harder to produce new knowledge as more knowledge is produced.⁹ It is beyond the scope of this review to summarise the mathematics involved in solving Jones's version of Romer's theory (see Jones and Vollrath, 2013, Chapter 5), but the major results can be presented in bullet points as before. In the basic Jones (1995a) study, this equilibrium per capita growth rate is determined by just three parameters (Jones and Vollrath, 2013, equation 5.7, p. 104).¹⁰

⁸ Romer's assumption is that $\Delta A = \theta L A A$, where ΔA is the change in knowledge, A , and θ is a constant. This assumption means that $(\Delta A/A) = \theta L A$.

⁹ For example, assume $\Delta A = \theta L A A^\lambda \varphi$, where φ is a parameter less than 1. Jones also assumed that created new knowledge is less than proportional to $L A$ (as mentioned earlier in the text), but this detail is not so crucial.

¹⁰ In mathematical notation, if $\Delta A = \theta(LA)^\lambda(A)^\varphi$, then per capita growth is given by $\lambda n/(1-\varphi)$, where $0 < \lambda \leq 1$ measures the inverse of the wasted effort by researchers ($\lambda = 1$ implies no wastage) and $\varphi < 1$ measures the productivity of knowledge production as the level of knowledge increases ($\varphi = 0$ implies that knowledge workers do not use any existing knowledge in producing new knowledge).

- ▶ Per capita growth depends positively on the growth in the population, n .
- ▶ Per capita growth depends negatively on the extent to which research effort is wasted on duplication as the number of knowledge workers increases.
- ▶ Per capita growth depends negatively on the extent to which it becomes harder to produce new knowledge as the level of current knowledge increases.

Thus the analysis reproduces many features of the neoclassical growth model. It is possible for policies to generate a *level* change in production per capita, but the economy returns to an underlying equilibrium *growth* rate that is generally impervious to policy. Institutions might be encouraged for reducing wasted research effort or increasing the ease of producing new knowledge, but there is no impact on growth by increasing, for example, the share of the population that is employed in research (Jones and Vollrath, 2013, p. 106).

It is possible to test variations of this model. Jones and Vollrath (2013, section 5.3), for example, discuss an approach based on Schumpeter's (1943) ideas of creative destruction, following Aghion and Howitt (1992). In this approach, innovation occurs in steps (rather than continuously) and some existing technology becomes redundant. Nevertheless, this version produces the same average long-run growth rate as is produced in the Jones version of the Romer model: that is, the above three bullet points still apply.

4.3 The impact of human capital on an individual country's growth

The models in sections 4.2 and 4.3 are best interpreted as applying to the world as a whole. Chapter 6 of Jones and Vollrath (2013) asks the question, what happens if the rate of technological progress being achieved at the frontier of developments is fixed, but different countries have different capabilities for utilising the new knowledge that is being produced.

The basic idea is that the ability of a country to utilise the new technologies being produced is limited by the skills of their labour force, which is related to the length of time people spend acquiring human capital. Thus, "the more time individuals spend accumulating skills, the closer the economy is to the technological frontier" (Jones and Vollrath, 2013, p. 144).

In the steady state, the key variables grow at the world rate of technological progress, but the *level* of output per worker will be higher, everything else being the same, if (see Jones and Vollrath, 2013, pp. 144–145):

- ▶ the share of output devoted to producing physical capital goods is higher
- ▶ the rate of population growth is lower
- ▶ the depreciation rate of capital is lower
- ▶ the amount of time spent by workers acquiring human capital is longer.

These are similar to earlier results in chapters 2 and 3. Again, variants producing similar outcomes are possible; Ciccone and Papaioannou (2009), for example, assume that higher education levels in a workforce facilitates the growth of higher technology industries in the country, which contributes to higher productivity than would otherwise have been possible.

4.4 The impact of research and development on growth

This section discusses an approach in which innovation policies can have an impact on the rate of per capita economic growth. Although it is accepted that the *size* of the knowledge worker sector is not relevant, a second generation of endogenous growth theories argues that the *proportion* of the work force devoted to research and development can affect per capita economic growth.

This approach addresses the critique by Jones (1995a), but restores Romer's original formulation that increases in knowledge are proportional to the existing level of knowledge. It then assumes that the effectiveness of the research and development diminishes as the economy grows. This is because the research and development has to spread over a greater number of products (see, for example, Young, 1998; Howitt, 1999; Ha and Howitt, 2007; and Ang and Madsen, 2011).

Again, the mathematics need not detain us in order to concentrate on the results.¹¹ The critical difference is that in this approach, policies that increase the proportion of the labour force devoted to research and development can permanently increase the equilibrium growth rate. Thus, the three bullet points in the Jones model are replaced by:

- ▶ Per capita growth depends positively on the proportion of the labour force devoted to producing new knowledge ready for utilisation in production.
- ▶ Per capita growth depends negatively on the extent to which research effort is wasted on duplication as the number of knowledge workers increases.

Ha and Howitt (2007) and Ang and Madsen (2011) present empirical evidence that this model is better than the Jones (1995) approach for explaining growth rates in the United States and in Asia respectively.

4.5 Conclusion

The literature presented in this and the previous two chapters suggest that a country's standard of living depends on a relatively small number of parameters such as the share of output devoted to producing physical capital goods and the amount of human capital acquired by its workforce. These factors do not generally affect the economy's long-run steady-state growth rate, although of course the economy will grow faster in a transition from a low growth rate equilibrium to a high growth rate equilibrium (if, for example, the human capital of its labour force is permanently raised).

There is one exception to this general rule, discussed in section 4.4. The second generation of

¹¹ Briefly, let $\Delta A = \theta(LA/Q)\lambda A$, where LA is the number of knowledge workers, Q is a measure of product variety and λ measures the inverse of the wasted effort by researchers as before. Notice the lack of a coefficient on A , so that the level of current knowledge has a full impact on new knowledge being produced. Q is assumed to be proportional to population, L , in the model's steady state. Growth of knowledge in this model is given by $\theta(LA/L)\lambda$, so that an increase in the share of the labour force devoted to knowledge production (that is, LA/L) permanently increases the economy's per capita growth rate.

endogenous growth models finds that the *proportion* of the labour force who specialise in the production of new knowledge has an impact on the equilibrium growth rate. Thus policies that increase this proportion, everything else staying the same, are predicted to create a higher per capita growth rate for the economy. This approach relies on an assumption, which is in turn based on recognition that knowledge is non-rival in consumption, that the amount of new knowledge created each period is proportionate to the total level of existing knowledge.

These ideas provide a general framework for thinking about how policies can affect a country's standard of living; Chapter 5 will discuss how they have been applied in a series of important themes discussed in the international literature on how to improve economic performance in a developed country like New Zealand.

5. Systematic approaches to economic development

The previous chapters have highlighted a small number of parameters influencing material standards of living or (in one case) the long-run equilibrium growth rate. These parameters are: the rate of population growth; the proportion of output devoted to investment in physical capital; the rate of depreciation of physical capital; the degree of investment in its labour force's human capital; the level of social capital; the level of current knowledge; the extent to which research effort results in wasteful duplication; the extent to which it becomes harder to produce new knowledge as the level of current knowledge increases; and the proportion of the workforce that specialises in producing new knowledge.

Within that general framework there have been a number of specific systematic approaches to understanding how economic development can be promoted, including searching for ways to improve the quantity or quality of the above parameters. This chapter aims to present a précis of important examples of these approaches, particularly where there has been a specific application to New Zealand. These examples are under seven major headings:

- ▶ Krugman's theory of agglomeration economics
- ▶ heterogeneous regional development models
- ▶ evolutionary economics and path-dependency
- ▶ Porter's theory of competitive advantage
- ▶ Skilling's theory of small country strategies
- ▶ resource-based economic development
- ▶ Florida's theory of the creative class.

Each of these headings is considered in sections 5.1 to 5.7 respectively. There is a large amount of literature on each of these models of economic development; the intention of these sections is to highlight their main features and to discuss how they are related to the central models of economic growth discussed in earlier chapters of this report. The chapter finishes with a brief conclusion in section 5.7.

5.1 Krugman's theory of agglomeration economics

Recall from section 4.1 that if knowledge is an input into production, it means that production involves "increasing returns to scale". In 1991, Paul Krugman published a famous article that demonstrated how the property of increasing returns to scale in manufacturing can result in a process of 'circular causation' in which "manufactures production will tend to concentrate where there is a large market, but the market will be large where manufactures production is concentrated" (Krugman, 1991, p. 486). The outcome is a densely populated industrial core in cities and a sparsely populated agricultural sector in the periphery.

Krugman also showed that this process depended on a small number of parameters such as the share of manufacturing in the national economy, the extent of economies of scale in that sector and transportation costs throughout the economy. A lower share of manufacturing, lower economies of scale and higher transportation costs made the agglomeration pattern less likely. This model of agglomeration became the starting point for the new field of modern economic geography (Krugman, 2008, p. 344).

Krugman's original paper emphasised that his assumption of economies of scale was more general than an assumption that knowledge is an input into production; nevertheless, others have suggested that knowledge is an important example. Philip McCann, for example, has applied the insights of economic geography to an analysis of what he termed New Zealand's productivity paradox. In that article, he made the following observation (McCann, 2009, p. 292):

However, the major advantage of agglomeration in the modern world is widely regarded as being about maximising the efficiency and effectiveness of knowledge exchanges (Glaeser, 2008) in the production processes of high value-added goods and services in a diverse economic environment (OECD, 2006a).

McCann (2009, p. 300) draws the following conclusion:

The major characteristics of the New Zealand economy, that is, a small and extremely isolated country, with small urban centres, and a low degree of export diversity, is a combination of structural characteristics that is not productivity-enhancing in the modern phase of globalisation, relative to other countries in other places. As such, the observed [poor] productivity performance of New Zealand is more or less exactly as expected according to economic geographic theory. Moreover, many other characteristics of the relationship between New Zealand and Australia and between New Zealand's own regions internally are also largely as predicted by economic geography.

McCann goes on to discuss a wide range of policy options that might offset some of these disadvantages. This includes policies aimed at increasing New Zealand domestic agglomeration effects, focused on increasing the scale of the Auckland-Hamilton-Tauranga triangular city-region and on upgrading the connectivity of Auckland to the rest of the country (for example, by reducing domestic airfares and rapidly upgrading New Zealand's broadband infrastructure). There is no simple solution, however; McCann (2009, p. 297) observes for example that:

Even though there is no simple direct relationship between urban scale and productivity, all of the world's most productive cities are at least twice the size of Auckland, and most are between three and five times the size of Auckland (OECD, 2006a).

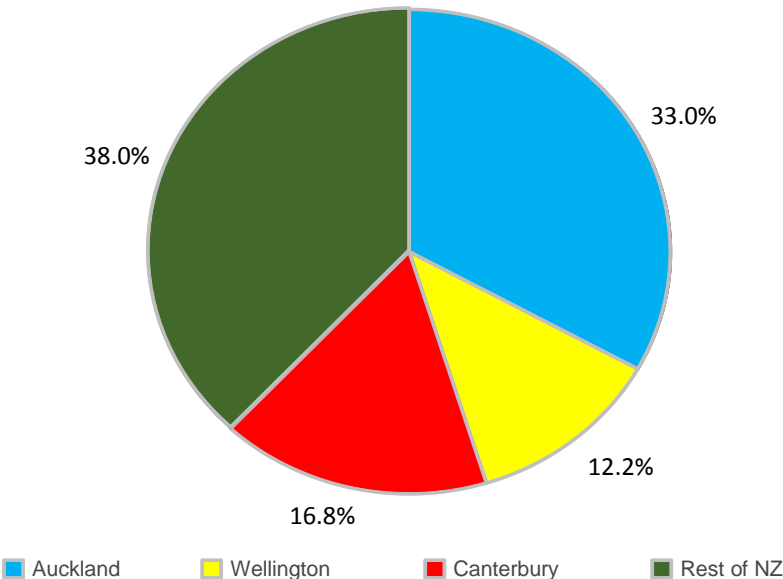
5.2 Heterogeneous regional development models

The text so far has presented models that have focused on economic development at a global or national level. Another approach is to argue that a country’s development depends on the development of its regions. This approach therefore suggests that policies should aim to strengthen regional economies in order to strengthen the national economy.

A recent example of this approach is a study of the contributions of regions to aggregate growth in the OECD by Garcilazo and Oliveira Martins (2013). Their study was based on an analysis of 1,679 small regions (called Territorial Level 3 regions, or TL3 regions) with each region defined within a higher level TL2 region within national borders. The analysis confirmed the well-established observation of large heterogeneity in regional economic performance within the OECD. They summarise their main results as follows (*idem*, pp. 3–4).

This implies that a few large (FL) regions contribute disproportionately to aggregate growth whereas many small regions (MS) contribute only marginally. Nevertheless, because the number of these smaller regions is very large, their cumulated contribution to growth is actually dominant. For the period 1995–2007, only 2.4% of OECD TL3 regions contribute to 27% of OECD GDP growth, but the remaining 97.6% corresponds to 73%.

It is interesting to compare this summary with the New Zealand situation. Statistics New Zealand has recently published official data on regional gross domestic product based on the country’s regional councils (combining Tasman and Nelson) for the years 2007 to 2013. Over that period, nominal gross domestic product (that is, including the impact of inflation on production prices) for the country grew by 24.5 percent in total or by 3.7 percent per annum. One-third of that growth took place in Auckland and just over three-fifths took place in Auckland, Wellington and Canterbury (see Figure 5). Nevertheless, this means that 38 percent of New Zealand’s growth came from outside these three areas.



Source: Statistics New Zealand regional gross domestic product data.

Figure 5: Regional contributions to economic growth in New Zealand, 2007 to 2013

Thus an approach focusing only on agglomeration economics can miss important contributions to national development. The OECD paper finishes with two policy implications (*idem*, p. 14):

First, as the patterns of growth at the regional level follow an approximate power law, the concept of an 'average region' has little meaning and may be not at adequate target for policy. Second, while policy makers should ensure the few regions with the strongest contribution to aggregate growth continue to be competitive and maintain their levels of income, improving the performance of periphery and even lagging regions should not be neglected because their cumulated contribution is dominant. Indeed, although the potential is certainly not equal, possibilities for growth seem to exist in many different types of regions.

There is substantial literature on best practices for local development summarised, for example, in the contributions to Beer et al. (2003) and Rowe (2009); see also Chapter 6 later in this report. A common element in this literature is the idea that local development involves supporting local leadership to mobilise local resources (Stimson et al., 2009; Beer and Clower, 2014). This idea is often termed *endogenous* development because it is based on local resources rather than being based on transfers from central government or taxpayer-funded subsidies to attract a large enterprise offering new jobs.

The focus on mobilising local resources leads to proposals to foster *regional* innovation systems (Gunasekara, 2006; Peer and Penker, 2014) and *regional* skills ecosystems (Finegold, 1999; Buchanan and Jakubauskas, 2010). These proposals are built on Adam Smith's themes of specialisation and trade discussed in section 2.4. Each region builds institutional partnerships that aim to produce new knowledge (the regional innovation system) and skilled workers (the regional skills ecosystem) that match the region's particular strengths and opportunities.

Rowe (2005) contains thirteen essays applying this approach to New Zealand. In his final chapter, James Rowe suggested the following general conclusion (*idem*, pp. 222–223):

... 'successful' regions have a number of options but focus on a small range of activities designed to build on their regional strengths and tackle weaknesses, with their main emphasis on building capability:

- ▶ *they pursue this approach over long periods of time;*
- ▶ *they use a wide range of techniques to achieve these ends;*
- ▶ *they prioritise the building of an enterprise culture and concentrate on helping develop existing businesses with growth potential and also provide a wide range of practical support to start-ups; and*
- ▶ *they involve groups representing all aspects of the community working to the agreed priorities in formal and informal partnerships in both the strategy formulation and the programme implementation stages. These groups are often business led.*

5.3 Evolutionary economics and path-dependency

An early statement of the unifying principles of evolutionary economics was the “prospectus” published by Richard Nelson and Sidney Winter in the *Economic Journal* in 1974 (see also Nelson and Winter, 1982). That article focused on the relationship between technological change and economic growth, contrasting the evolutionary approach with the neoclassical approach that had been summarised by Solow (1970). The authors criticised the explicit or implicit commitment of neoclassical growth theory to assumptions of faultless maximisation and equilibrium, arguing that these assumptions are inconsistent with the literature on how technological progress proceeds in firms and by entrepreneurs (Aldrich and Yang, 2014, is a recent example of this literature).

Instead, evolutionary theory adopts a ‘behavioural’ approach to individual firms, including the basic premise “that a firm at any time operates largely according to a set of decision rules that link a domain of environmental stimuli to a range of responses on the part of firms” (Nelson and Winter, 1974, p. 891). A later survey expanded this idea to the level of society or the economy (Dosi and Nelson, 1988, p. 158):

More generally, evolutionary theory can be viewed as a theory about how society, or the economy, learn: in very special cases learning leads to the convergence to some repertoires of “optimal behaviours”; normally it entails more or less temporary, and high suboptimal, adaptation to what are perceived to be the prevailing environmental constraints and opportunities, and also a lot of systematic errors, trials, and discoveries.

This leads to a focus on path-dependent dynamic processes that take into account the way in which learned behaviours “are guided and constrained by socially held and enforced values, norms, beliefs, customs, and generally accepted practices” (*idem*, p. 159):

Putting it another way, the behavioural foundations of evolutionary theories rest on learning processes involving imperfect adaptation and mistake-ridden discoveries. This applies equally to the domains of technologies, behaviours and organizational setups.

Boschma and Lambooy (1999) explicitly consider how evolutionary economics links to key concepts and results in the economic geography literature in an effort to understand why regions differ in their ability to generate or adopt new technologies and why the capability of a particular region may change over time. A key concept is the evolutionary notion of *path-dependency* that results in regions having diverse capabilities in terms of collective knowledge, institutional structures and social conventions (citing Storper, 1997).

It means, for example, that:

Established industrial regions can become locked into rigid trajectories because their techno-industrial legacy of the past (in terms of resources, competences and socio-institutional structures) has eroded or weakened their ability to adjust to new technology (Boschma and Lambooy, 1999, p. 416).

It also means that increasing returns and agglomeration economies can, with effective human agency, turn an historical accident of short-term advantage into a long-term self-sustaining path of local expansion (*idem*, pp. 424–6, citing Arthur, 1994).

Boschma (2009) explored some possible implications for regional innovation policy in a paper prepared for the OECD. The paper pays particular attention to the role of knowledge in driving economic growth. It argues that regions must continuously transform and renew their economic bases to sustain long-term development (*idem*, p. 8):

Regions may have a number of options to restructure their economies in the long run. A sustainable option is to diversify regional economies into new fields while building on regional assets. The long-term development of regions may depend on their ability to develop new sectors or new market niches that have their roots in the current regional knowledge base. It means that regional economies should branch into new directions rather than start from scratch when they diversify, and related variety may be a key source for that.

A number of commentators in New Zealand have explored how the country's economic development is influenced by its economic history. A recent and influential example is Shaun Hendy and the late Sir Paul Callaghan's book, *Get off the Grass: Kickstarting New Zealand's Innovation Economy*. As the title suggests, this book argues that New Zealand should reduce its investment in land-based sectors in favour of growing new high-tech industries (Hendy and Callaghan, 2013, p. 105):

What lessons can we learn for New Zealand? Our opportunities for growth are affected by our past decisions about what to specialize in. So does our previous focus on primary-sector commodities mean that New Zealand is fated to remain a low-complexity economy? Not necessarily: if we are willing to develop a more diverse knowledge base, we will be able to increase the complexity – and prosperity – of our economy by growing new high-tech industries.

Other commentators have agreed that new knowledge-driven enterprises are an important aspect of New Zealand's economic future, but have argued that there are also gains to be captured by transforming the country's traditional strengths in land-based commodity exports. A good example was Colin Webb and Craig Grant's research paper published by the Tertiary Education Commission in April 2003, which suggested that firms in New Zealand can be categorised into four segments (Webb and Grant, 2003, p. iii):

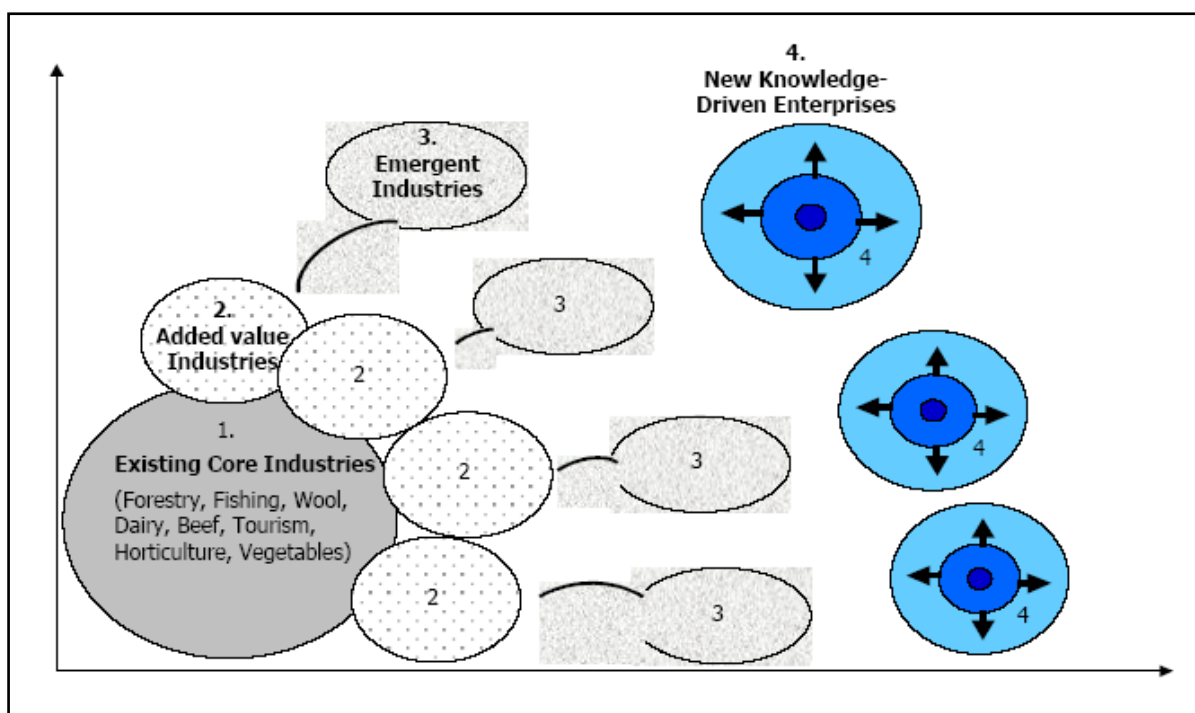
Segment 1: Existing core industries – representing most of the existing export economy and largely based around products that are mostly commodities.

Segment 2: Value-adding existing industries – representing the higher value firms that already exist or are emerging from core industries in segment 1.

Segment 3: Emergent industries – representing industries that have migrated into very different and high value markets removed from their original sectors, or businesses that were originally focussed on servicing the industries in segments 1 and 2, but are now established as high value industries in their own right.

Segment 4: New knowledge-driven enterprises – representing the seeding and development of technology-intensive or highly creative enterprises that are new for New Zealand.

As shown in Figure 6, Webb and Grant cited forestry, fishing, wool, dairy, beef, tourism, horticulture and vegetables as examples of segment 1 industries. They argued that “there is significant value to be gained by New Zealand from the migration of [these] industries that are suffering from poor and declining margins in segment 1, to segment 2 of the framework”, which they further argued would require “a shift in focus towards adding value, differentiating the resource and better capturing value by these existing industries” (*idem*, p. 6).



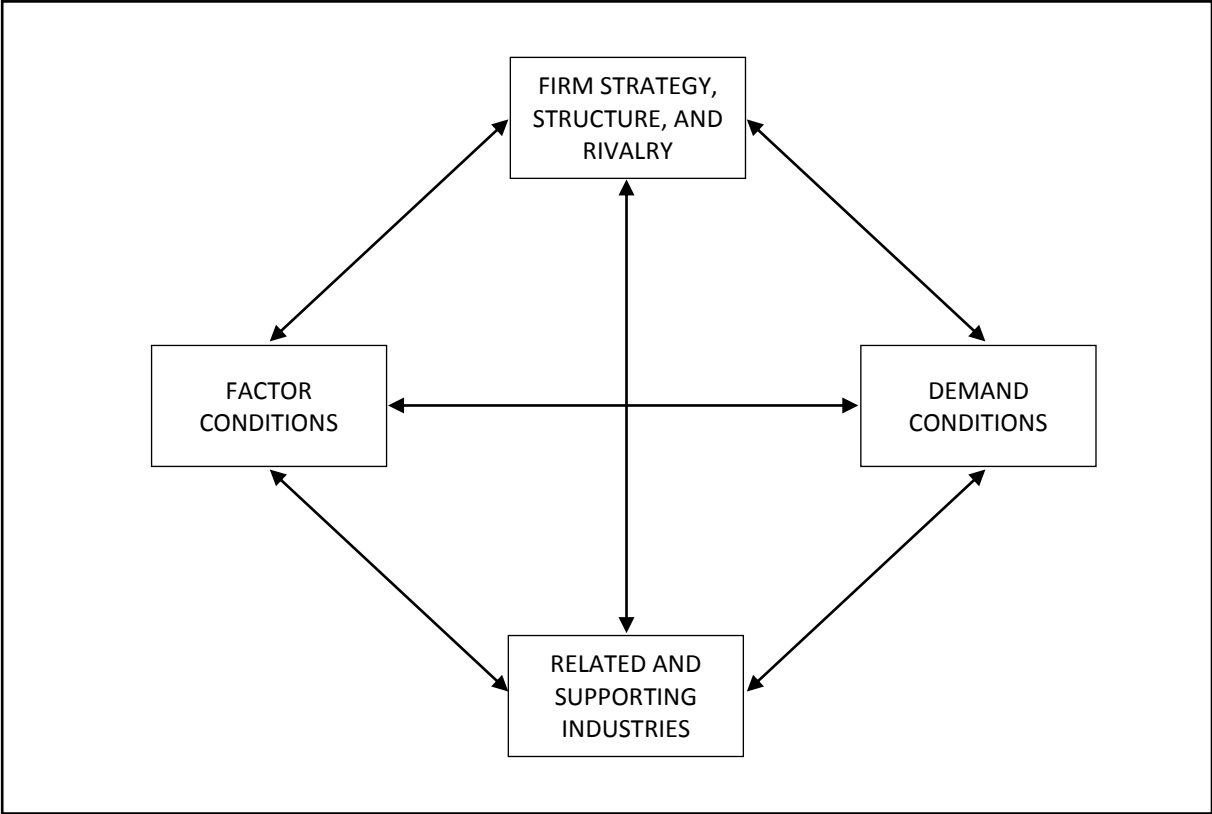
Source: Webb and Grant (2003, p. 6).

Figure 6: Webb and Grant's Economic Transformation Framework

5.4 Porter's theory of competitive advantage

Section 2.4 noted that David Ricardo applied Adam Smith's concepts of specialisation and trade to countries, demonstrating how two countries could raise their standards of living by specialising in a model, comparative advantage depended on each country's endowments of factors of production (for example, labour, natural resources, capital and technology), but Michael Porter (1985, 1998) observed that countries could build what he termed competitive advantage through a strategic approach to economic development.

Porter presented his theory in the form of what has become known as the Porter diamond (see Figure 7). Ricardo’s factors of production appear as one of the four corners of the diamond diagram, but they are supplemented with attention to the home demand conditions for the industry’s product or service, to the presence of supplier or related industries that are internationally competitive, and to the country context in which firms are created, organised and managed as well as the nature of domestic rivalry.



Source: Porter (1998, Figure 3-1, p. 72).

Figure 7: The determinants of national competitive advantage

Crocombe et al. (1991) applied this theory to New Zealand. They drew a number of conclusions about implications for the country, which they summarised in a series of bullet point headings reproduced in Table 2.

A key idea in Porter’s theory is that the competitive industries in a nation are not generally distributed evenly across the economy; instead “the systemic nature of the ‘diamond’ promotes the *clustering* of a nation’s competitive industries” (Porter, 1998, pp. 148–149; emphasis in original). This phenomenon can be considered as combining the importance of agglomeration economics (section 5.1 above) and heterogeneous regional development (section 5.2). Thus Porter goes on to comment (*idem*, p. 152; emphasis again in the original text):

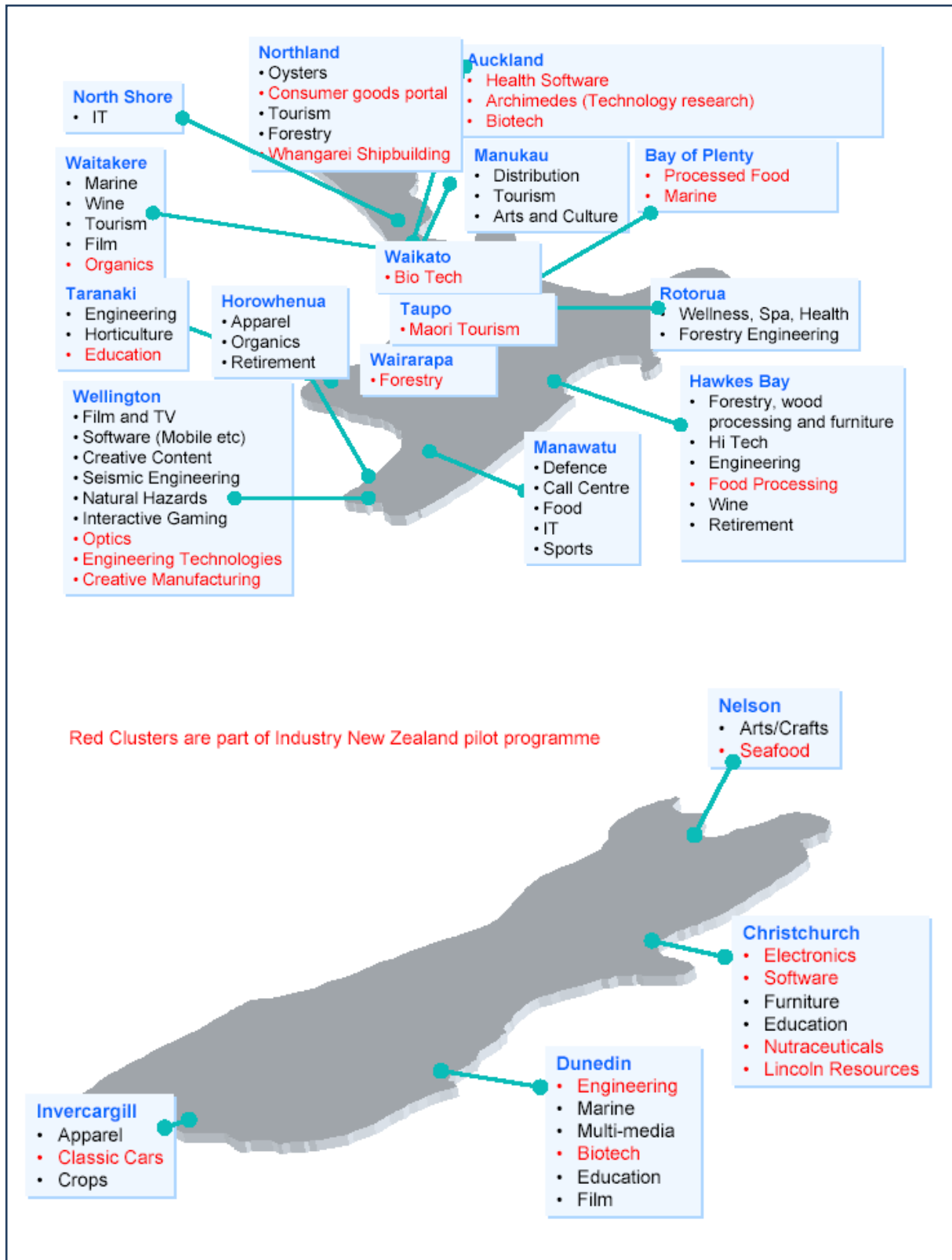
Underlying the operation of the national “diamond,” and the phenomenon of clustering, is the exchange and flow of information about needs, techniques, and technology among buyers, suppliers, and related industries. When such interchange occurs at the same time that active rivalry is maintained in each separate industry, the conditions for competitive advantage are the most fertile.

Table 2: Implications of Porter's theory of competitive advantage for New Zealand

<p>Implications for company strategy</p> <ul style="list-style-type: none">▶ Move beyond cost-based strategies▶ Seek opportunities where New Zealand's home environment is uniquely favourable▶ Become more knowledgeable competitors▶ A greater focus on innovation▶ Invest in human resource development▶ Forge closer links with educational institutions▶ Adopt a more global approach to strategy▶ Seek international success rather than local dominance▶ Corporate leadership rather than administration <p>Implications for industry associations</p> <ul style="list-style-type: none">▶ Adopt human-resource development as a central goal▶ Set high product and process standards▶ Provide a clearinghouse for information▶ Coordinate business support for member firms▶ Focus on upgrading competition, not eliminating it <p>Implications for government policy</p> <ul style="list-style-type: none">▶ Move beyond macroeconomic policy▶ Upgrade New Zealand's human resources▶ Stimulate domestic competition▶ Improve business access to capital▶ Provide the proper incentives▶ Upgrade the technological base▶ Improve New Zealand's transportation and communication infrastructure▶ Upgrade local demand conditions▶ Stimulate development via clusters▶ Stimulate new-business formation▶ Form a new business government relationship
--

Source: Crocombe et al. (1991, Chapter 7).

In 2002, Cluster Navigators Ltd (see www.clusternavigators.com for their current website) prepared an analysis of potential clusters in New Zealand by region. A map of that analysis is shown in Figure 8 to illustrate how the theory can be applied.

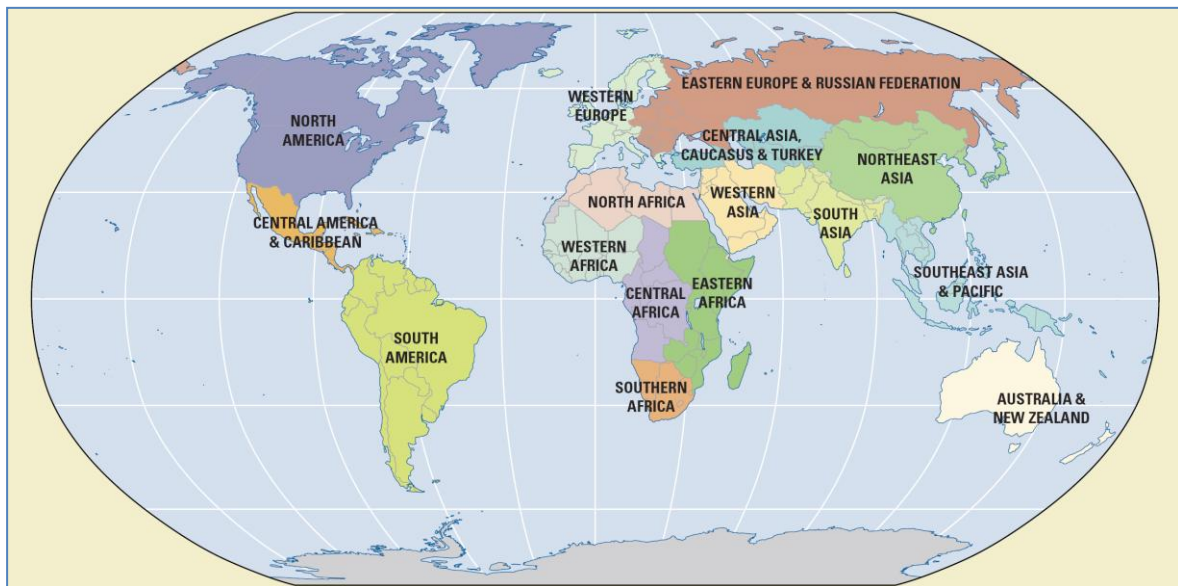


Source: Cluster Navigators Ltd for Industry New Zealand, May 2002.

Figure 8: Potential Clusters in New Zealand, May 2002

5.5 Skilling's theory of small country strategies

Building on the ideas of the previous three sections, it is possible to conceptualise the New Zealand economy as part of a region in the global economy. This is illustrated in Figure 9, which reproduces a map from the World Bank's (2009) *Economic Development Report*. The map identifies 16 regions in the global economy, including a combined Australia and New Zealand region. If this perspective is adopted, then some of the tools of analysis for supporting regional development can be applied to New Zealand in an international context.



Source: World Bank (2009, p. 36).

Figure 9: Regions of the Global Economy

This idea has been pursued by David Skilling, the founding director of the former New Zealand Institute and now Director of the Landfall Strategy Group in Singapore. Skilling argues that small countries like New Zealand and Singapore need to focus on two areas to engage successfully in the global economy (Skilling, 2012a, p. 22).

First, develop a clear policy agenda that engages seriously with the global environment, and positions the country to compete in the changing global context. Second, to deliver this policy agenda, governments will need to invest in strengthening public sector strategic capacity, political institutions and social cohesion so that there is a shared understanding and sense of direction.

Skilling observes that small countries have generally performed better than large countries over the last two decades, with higher per capita income growth rates of about half a percentage point on average. He attributes some of this success to a global economic and political environment that has been more supportive of small country performance in previous periods, but he suggests that it is also due in part to intrinsic characteristics of small countries and the policy choices they have made.

In particular, Skilling offers evidence that social capital and trust are higher in small countries, small countries are more responsive to changes in the rest of the world, and small country governments are more effective in their performance than large country governments. These characteristics make it easier for small countries to develop and implement a widely accepted national strategy (*idem*, p. 23):

Small countries need to be able to develop a clear perspective on how they will compete, and then invest to develop these areas of competitive strength. This will involve choices being made in terms of where to invest to develop a distinctive position. This could be an industry sector or a capacity like the innovation ecosystem, a low tax rate, or the quality of the country's human capital or infrastructure.

Not all small countries have performed well, however, and New Zealand is one of the poorer performing examples. Skilling (2012b) considered the reasons for this outcome in a presentation he gave to the New Zealand Treasury. He argued that “New Zealand has an out-dated view of the global economy – that of a commodity exporter – and has not fully recognised that responding to the emerging global realities requires a more deliberate, strategic, comprehensive approach to policy” (*idem*, p. 1).

5.6 Resource-based economic development

One of the stylised facts of economics is that “countries rich in natural resources tend to perform badly”, a phenomenon that Sachs and Warner (2001, p. 827) call the curse of natural resources. The authors confirm this observation with their own empirical analysis and suggest it may be due to resource-abundant countries tending to have a relatively high price level, making high-value manufactured exports less competitive.

Torvik (2009), however, observes that this pattern is not universal, commenting that for every Nigeria or Venezuela there is a Norway or a Botswana where abundant natural resources have not inhibited development. The paper reproduces a table from Matsen and Torvik (2005) that lists New Zealand as one of the countries claimed to have escaped the resource curse. Torvik (2009) suggests that the explanation may lie with the different political economy characteristics of the two groups of countries, with revenues in the poor performing countries dissipated into areas such as rent-seeking or poor capital investment projects. New Zealand’s sound government, political, business and civil institutions (see www.transparency.org.nz) undoubtedly contribute to better outcomes in resource use.

Davis and Vasquez Cordano (2013) explore the resource curse in the context of mining products. They observe that natural-resource exporting countries tend to tax mineral exports and impose import restrictions to protect other domestic sectors, meaning that they are less open to international trade. They estimate that this reduces their growth in output per worker by 0.1 to 0.2 percent on average each year. They also suggest that a booming mining economy may underinvest in public education, reducing potential growth.

Jones and Vollrath (2013) devote their Chapter 10 to “Natural Resources and Economic Growth”. It is relatively straightforward to incorporate non-renewable natural resources into the neoclassical growth model with exogenous technological progress. This is done by assuming that a constant fraction of the remaining natural resources is used in production each period, drawing on Dasgupta and Heal’s (1974) classic analysis. This means that the amount of the resource used in production declines over time as the resource is consumed. In the steady state, the *growth* rate of output per worker is higher, everything else being the same, if (see Jones and Vollrath, 2013, p. 234):

- ▶ the rate of technological progress is higher
- ▶ the rate of population growth is lower; or
- ▶ the rate of natural resource depletion is lower.

The last bullet point is a feature of the trade-off in the model between higher living standards in the present (by increasing natural resource depletion) and a lower rate of economic growth in the future. The authors further explore the implications if the population experiences other direct benefits from maintaining unexploited resources (including mitigation of global climate change from greenhouse gas emission). They conclude, for example, that the optimal use of natural resources in production will tend to fall as living standards rise, because natural resources become more valuable relative to the benefit of extra material consumption.

Acemoglu et al. (2012) summarise some of the previous literature on natural resource constraints in growth models and offer their own contribution to understanding how an economy on a growth path may become caught up in dynamics that result in environmental degradation and disaster. Their model assumes two potential technologies, one of which is damaging to the environment and one of them is not. Depending on some underlying parameters, temporary government intervention to penalise use of the former technology or subsidise use of the latter technology shifts the growth path towards better environment outcomes.

In New Zealand there has been some debate about resource extraction in the country’s economic development. Baxter et al. (2014), for example, prepared a report for the Coal Action Network Aotearoa that argued coal-mining is a sunset industry so that national policy needs to plan a process away from coal to new industries and new jobs to give coal-mining communities options. Solid Energy is the largest coal-mining company in New Zealand. It has developed a business strategy “based predominantly on continuing global demand for coking coal driven primarily by steelmakers in New Zealand, India, China and Japan” (Solid Energy, 2013, p. 5).

5.7 Florida’s theory of the creative class

Chapter 4 observed that the second generation of endogenous growth theories suggests that a country’s rate of economic growth can be influenced by the proportion of the workforce who specialise in the production of new knowledge. Even if the assumptions that produce this result are not satisfied, other approaches routinely find that standards of living can be influenced by the proportion of the population that are highly educated and so highly productive.

Richard Florida argues that this feature of modern economies is giving rise to a new social class, the

Creative Class, comprised of people who use their creativity as a key factor in their work in business, education, health care, law or other professions (Florida, 2002, p. xiii):

Because creativity is the driving force of economic growth, in terms of influence the Creative Class has become the dominant class in society. Only by understanding the rise of this new class and its values can we begin to understand the sweeping and seemingly disjointed changes in our society and begin to shape our future more intelligently.

This means that “regional economic growth is driven by the location choices of creative people” (*idem*, p. 223), which Florida argues depends on three dimensions of a quality place (*idem*, p. 232):

- ▶ *What’s there: the combination of the built environment and the natural environment; a proper setting for pursuit of creative lives.*
- ▶ *Who’s there: the diverse kinds of people, interacting and providing cues that anyone can plug into and make a life in that community.*
- ▶ *What’s going on: the vibrancy of street life, café, culture, arts, music and people engaging in outdoor activities – altogether a lot of active, exciting, creative endeavors.*

Florida goes on to identify what he terms the 3Ts of economic development: technology, talent and tolerance. He suggests that regions should think simply about building a good business climate; they also need to think about building a good people climate by investing in lifestyle amenities that people really want and use. He concludes (*idem*, p. 320):

Given that creativity has emerged as the single most important source of economic growth, the best route to continued prosperity is by investing in our stock of creativity in all its forms, across the board. This entails more than just pumping up R&D spending or improving education, though both are important. It requires increasing investments in the multidimensional and varied forms of creativity – arts, music, culture, design and related fields – because all are linked and flourish together. It also means investing in the related infrastructures and communities that attract creative people from around the world and that broadly foment creativity.

In New Zealand, Sir Paul Callaghan was a leader who advocated policies to make New Zealand “a place where talent wants to live” (Callaghan, 2013, p. 100; McGuinness, 2013). He was not thinking necessarily about attracting more people to New Zealand, but he was concerned about whether the new generation of New Zealanders would choose to live in this country (Callaghan, 2009, p. 2):

Our children go to London or Sydney or New York, and they like the lifestyle, they like the high salaries and they have plenty of Kiwi mates on hand. Our diaspora is around one million. ... Our prosperity gap, and especially our prosperity gap with the English-speaking world, causes a disconnect from children and grandchildren. Prosperity matters to families.

Callaghan called for a major cultural shift using language that is very familiar to readers of Florida (*idem*, p. 21):

If we are to attract the best scientific and technological entrepreneurs to base their business enterprise here, if we are to attract talented expatriate Kiwis home and retain the best of our own, then we need not only a vibrant science and technology culture, but great urban environments and a stimulating intellectual climate.

5.8 Conclusion

The themes discussed in this chapter cover a broad range of concepts, but they are united by their concerns for how best to generate and utilise new knowledge, including knowledge about a small country's opportunities for development in the global economy. Even the section on resource-based development included a caution to continue public investment in education. This commonality is not surprising. Because knowledge is non-rival in consumption, it is a major source of increasing returns to scale in production that can in turn be a major driver of rising living standards.

6. People-based and place-based policies

If it is accepted that knowledge creation and utilisation are key ingredients in a country's economic development, then central government policies aimed at improving "the knowledge economy" can operate in two dimensions. They can focus on the knowledge-based productivity of individuals within that economy (people-based policies) and on the knowledge-based productivity of particular communities and regions (place-based policies).

There is universal acceptance of the importance of people-based policies, but different countries at different times have put different levels of emphasis on place-based policies. The European Union, for example, devotes one-third of its budget to its Cohesion Policy. Even in that setting, however, there have been some marked changes in the share of economic resources devoted to its programmes and in the types of programmes that have been supported over the past twenty-five years; see Figure 10.

The purpose of this chapter is to introduce some of the principles underlying people-based policies (section 6.1) and place-based policies (section 6.2). In 2010/11 there were two influential reports published in Australia: the Tomaney report commissioned by the Australian Business Foundation and the Daley and Lancy report prepared by the Grattan Institute. Although the two reports addressed the same country context and used the same literature discussed in section 6.2, they arrived at opposite conclusions about the nature and value of place-based policies that are explained in section 6.3. The chapter finishes with a brief conclusion in section 6.4.

6.1 People-based policies

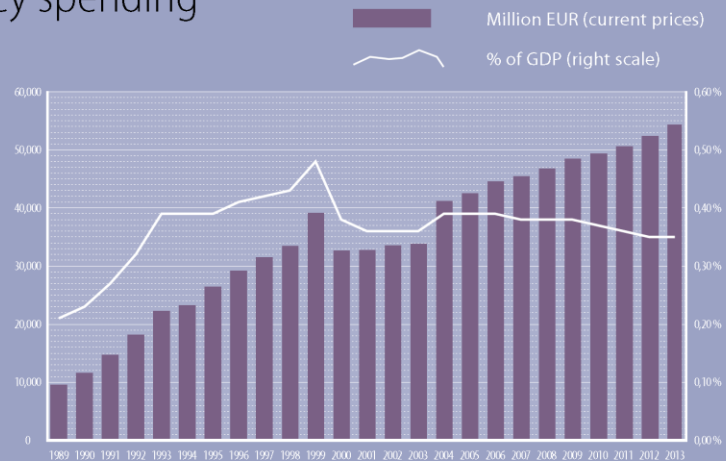
Previous chapters have returned again and again to the importance of human capital to a country's standard of living. Section 3.3, for example, drew attention to the study by Mankiw et al. (1992) that higher education levels increased average incomes and to the study by Knowles and Owen (1995) that better health standards are even more robustly associated with higher per capita income. Section 4.3 discussed the idea that a country's ability to access and utilise new technologies being developed internationally depends on the human capital of its population. More generally, chapters 4 and 5 were both organised around the key roles of knowledge creation and utilisation in economic development, where both roles require a highly educated population.

Thus there is universal support for policies that raise the education and health outcomes of people. This is evident in New Zealand, for example, where the ten key results identified in the central government's *Better Public Services* programme (launched in March 2012; see www.ssc.govt.nz/better-public-services) include the following four targets:

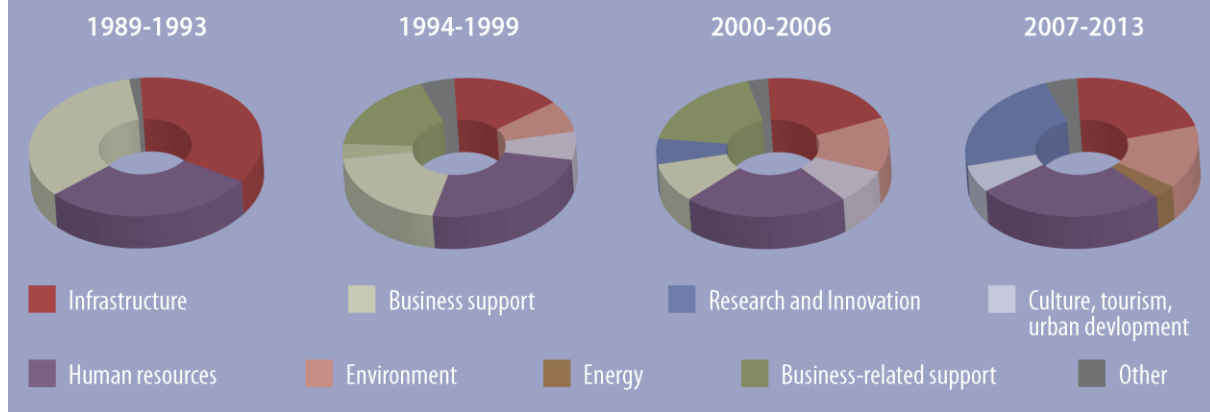
- ▶ increase participation in early childhood education
- ▶ increase infant immunisation rates and reduce the incidence of rheumatic fever
- ▶ increase the proportion of 18-year-olds with NCEA level 2 or equivalent qualification
- ▶ increase the proportion of 25 to 34-year-olds with advanced trade qualifications, diplomas and degrees (at level 4 or above).

1989-2013: Cohesion Policy spending

The graph shows the development of Cohesion Policy spending between 1989 and 2013 in absolute and relative terms. While amounting to just under €10 billion in 1989, the payments from the Structural and Cohesion Funds will have increased to some €54 billion by 2013 or one third of the EU budget. In relative terms, however, the size of the funds has hovered around 0.4% of the EU GDP since the end of the 1990s.



From infrastructure to innovation



Source: European Commission (2008, p. 39).

Figure 10: Cohesion spending in the European Union, 1989–2013

People-based policies include policies aimed at supporting business if those policies are available to businesses wherever they are located in the country. This is true, for example, of the Business Growth Agenda, which “aims to build a more productive and competitive economy by building business confidence, and addressing the issues that matter to firms” (New Zealand Government, 2014a, p. 3). It focuses on six factors that help business to grow: export markets, innovation, infrastructure, skilled and safe workplaces, natural resources, and capital markets.

People-based policies may have a spatial component since people and businesses are located in particular places. For example, if a country has issues of access to quality education and health services outside its main population centres, policies aimed at ensuring all citizens are able to develop their human capital are likely to require a special focus on more remote areas. This can be illustrated using a New Zealand example; namely, the government’s commitment to ensure all school students are able to develop “digital competencies”.

The motivation for this commitment is explained by O'Riley (2014, p. 6):

The pervasive digital environment is fundamentally changing the way our economy and society function. New Zealand's prosperity depends on our ability to compete in a flattened, global economy driven by innovation, specialisation and entrepreneurship. Citizens need increasingly sophisticated skills and digital competencies to effectively participate in shaping a healthy society and economy.

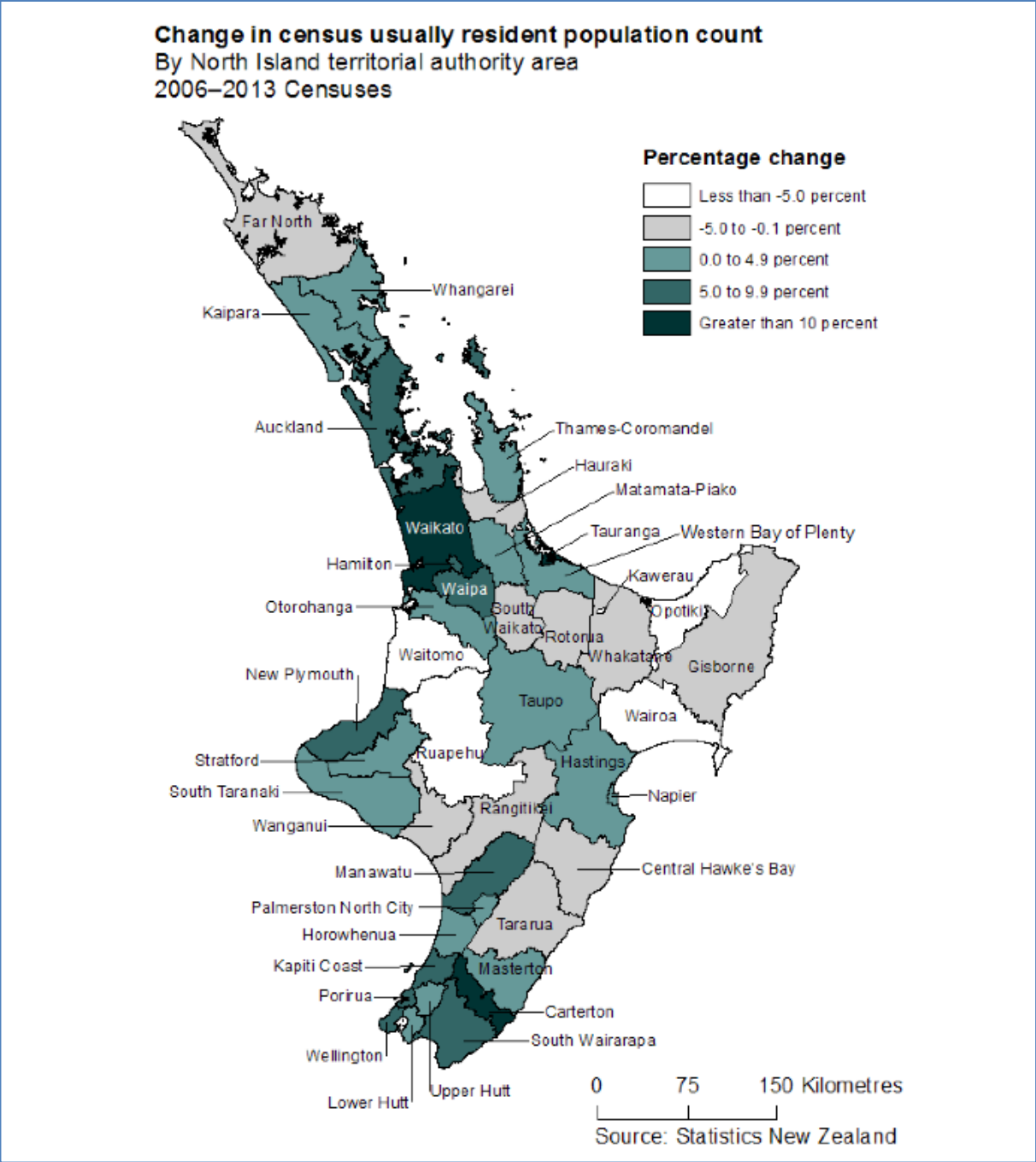
Consequently, the New Zealand government has prioritised schools to receive ultra-fast broadband, aiming for 97.7 percent of schools and 99.9 percent of students to have access to ultra-fast broadband by 2016. Fibre is not being delivered to the remaining 2.3 percent of schools because of their remote location, but these schools will have improved broadband access through wireless or satellite services (see www.minedu.govt.nz/theMinistry/EducationInitiatives/UFBInSchools.aspx). This is an example where people-based infrastructure investment is being made to support economic and social goals.

Similarly, the Business Growth Agenda has regional impacts because different regions have a different mix of industries and businesses. Thus, the Irrigation Acceleration Fund introduced as part of the infrastructure initiatives of the Business Growth Agenda is recognised as having been particularly valuable for the regions of Hawkes's Bay, Wairarapa, Canterbury and Otago (New Zealand Government, 2014a, p. 125). This relationship between national policy and regional impacts is indicated by the Hon Steven Joyce, for example, in his Minister's foreword to the *Regional Economic Activity Report 2014* (New Zealand Government, 2014b, p. 1):

The government is working to ensure that New Zealand as a whole and the 16 regions continue to grow and succeed. We have just refreshed the Business Growth Agenda, our blueprint for growing the economy. Many of the actions in the Business Growth Agenda, whether they are Primary Growth Partnership initiatives, Māori and Pasifika Trades Training, or roading projects, are regionally customised to strengthen local business environments.

There is an ongoing international debate about whether central government policy should attempt to go beyond people-based policies with other policies aimed at developing regions that are lagging behind other parts of the country. Figures 11 and 12 can be used to provide a context for this debate. They show changes in the resident population count recorded between the 2006 and 2013 Censuses for territorial authorities in the North Island and the South Island of New Zealand respectively.

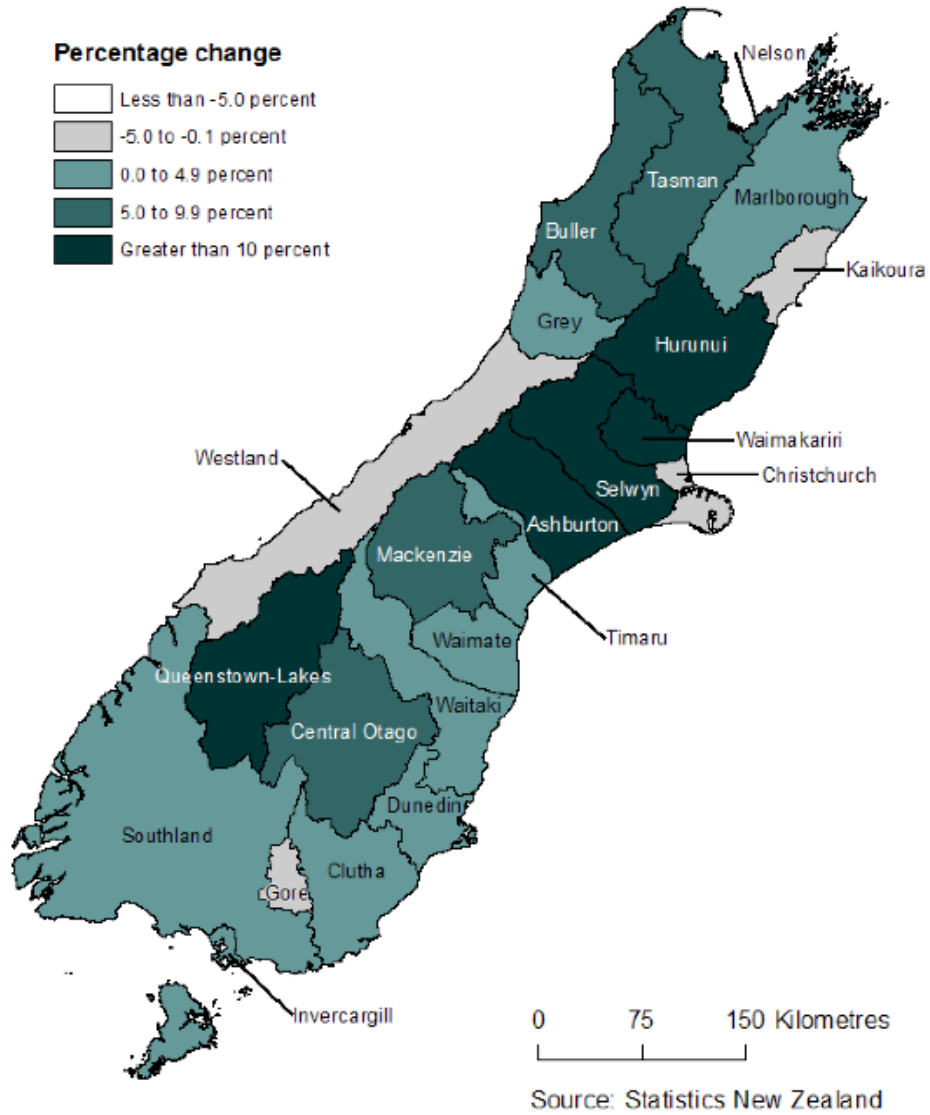
The two maps reveal that twenty areas experienced population declines, concentrated in the Far North and in the middle and eastern districts of the North Island (apart from a band from Otorohanga across to Napier). There were also pockets of population decline in Hauraki, Kaikoura, Westland and Gore. Are *place-based* policies desirable to address these trends?



Source: Statistics New Zealand (2013, p. 8)

Figure 11: Changes in population by territorial authority, North Island, 2006–2013

**Change in census usually resident population count
By South Island territorial authority area
2006–2013 Censuses**



Source: Statistics New Zealand (2013, p. 9)

Figure 12: Changes in Population by Territorial Authority, South Island, 2006–2013

6.2 Place-based policies

A hugely influential report by Fabrizio Barca, prepared as part of a reform of the European Union's Cohesion Policy, defined place-based development policy as (Barca, 2009, p. 5):

- ▶ *a long-term development strategy whose objective is to reduce persistent inefficiency (underutilisation of the full potential) and inequality (share of people below a given standard of well-being and/or extent of interpersonal disparities) in specific places,*
- ▶ *through the production of bundles of integrated, place-tailored public goods and services, designed and implemented by eliciting and aggregating local preferences and knowledge through participatory political institutions, and by establishing linkages with other places; and*
- ▶ *promoted from outside the place by a system of multilevel governance where grants subject to conditionalities on both objectives and institutions are transferred from higher to lower levels of government.*

The maps in Figures 11 and 12 above suggest where a place-based framework might be applied in New Zealand; namely, those districts experiencing ongoing population loss. New Zealand has elements of such an approach; for example, the Government has commissioned regional economic potential studies for the North Island's East Coast, for the Manawatu-Wanganui combined region and for Northland, but not to the depth that could qualify as a place-based policy in the above definition.

Indeed, there is a significant body of international research that argues place-based policies are misguided and may be counter-productive. This argument was famously the focus of the World Bank's *World Development Report* in 2009, which concluded, for example, that growth and welfare improvements might benefit from policies to facilitate movements of workers from lagging to leading places (World Bank, 2009, p. 158), exacerbating population loss in some regions.

Edward Glaeser and Joshua Gottlieb (2008, p. 155) explain that the criticism of place-based policies rests on three observations. First, agglomeration economics (see section 5.1 above) mean that people become more productive when they move from low population areas to high population areas. Second, the second generation of endogenous growth theories (section 4.4 above) find that concentrations of highly educated people increase the level and the growth rate of productivity in the region. Third, market adjustments occur as a result of these forces so that higher incomes in large cities (for example) are offset by higher costs of living, including higher prices for domestic housing and higher levels of congestion.

Based on these observations, Glaeser and Gottlieb observe that "there is nothing particularly equitable about taking money from rich places and giving it to poor places ... and the primary real effect will be to move people into economically unproductive areas" (*idem*, p. 156). Instead, they argue that a better strategy may be to help more people to move from poorer regions to richer regions, perhaps by policies designed to make housing cheaper in the country's large cities.

Fabrizio Barca, Philip McCann and Andrés Rodríguez-Pose (2012) have addressed these criticisms in presenting ‘the case for regional development intervention’. They repeat the argument made in section 5.2 above that “the economy as a whole can reach its total output frontier by developing places of different sizes and densities, because it is the performance of the urban and regional system as whole which is critical, rather than just the cities at the top of the urban hierarchy” (*idem*, p. 140). They also argue that current patterns of large cities and struggling regions are a result of history, context and path dependency (see section 5.3). Consequently, the place-based approach has two fundamental aspects (*idem*, p. 139):

First, the place-based approach assumes that geographical context really matters, whereby context here is understood in terms of its social, cultural, and institutional characteristics. As such, a space-neutral sectoral approach is regarded as inappropriate; what are apparently space-neutral policies will always have explicit spatial effects, many of which will undermine the aims of the policy itself unless its spatial effects are explicitly taken into consideration. Second, the place-based approach also focuses on the issue of knowledge in policy intervention. Who knows what to do where and when? Underdevelopment traps that limit and inhibit the growth potential of regions or perpetuate social exclusion are the result of a failure of local elites to act and can only be tackled by new knowledge and ideas: the purpose of development policy is to promote them through the interaction of those local groups and the external elites involved in the policy.

The OECD (2011, pp. 32–33) suggests that this understanding of development represents a paradigm shift in regional policy based on local resource mobilisation and innovation:

Since the late 1990s, the institutional school (Amin and Hausner, 2007) has defended a new vision for regional policy, conceived as a set of cross-sectoral initiatives supporting a more balanced development pattern on the basis of existing local strengths and assets. This new paradigm has been progressively adopted, and regional development policy now increasingly aims to create the conditions for endogenous growth in each territory on the basis of local assets, capabilities and economic potentialities (OECD, 2010).

By creating the conditions and the institutions to enhance productivity and well-being, regional development policies contribute to aggregate national performance. Regions are called to identify and exploit their own development potential, capitalising on their assets and clearing bottlenecks.

This paradigm shift, in vision but not always in practice, brings innovation to the core of the regional development agenda.

The OECD’s interest in this paradigm shift is driven, in part, by its research showing that investment in infrastructure is ineffective without simultaneous attention to regional systems for developing and supporting human capital and innovation. This is summarised in Table 3, which present the four policy recommendations provided in an OECD (2009) report on *How Regions Grow*. It states that “regional policies which promote infrastructural development will only be successful if human capital and

innovation are also present”, adding that “human capital and innovation are more important than a region’s physical distance from markets” (OECD, 2009, pp. 17–18). This returns us to the ideas of regional innovation systems and regional skills ecosystems discussed in section 5.2 above.

Table 3: OECD policy recommendations for regional growth

<p>Provide infrastructure as part of an integrated regional approach</p> <p>The analysis suggests that infrastructure alone has no impact on regional growth, unless regions are endowed with adequate levels of human capital and innovation. In other words, infrastructure is a necessary but insufficient condition for growth. The analysis also reveals that it requires on average approximately three years to positively influence growth.</p> <p>Invest in Human Capital</p> <p>Regions with insufficient human capital will not grow, while those with increased levels will reap the benefits of endogenous elements of growth. The effects of investing in tertiary education on regional growth are also positive, after a period of approximately three years. Human capital also has a strong indirect impact on regional growth by increasing the rate of patenting. Thus, regional policies which promote infrastructural development will only be successful if human capital and innovation are also present.</p> <p>Emphasise innovation and research and development</p> <p>Investments in R&D have a positive effect on patent activity in all categories considered, as do R&D expenditures by businesses, the public sector, higher education institutions and the private non-profit sector. However, innovation is a longer-term process and only appears to have a positive influence on regional growth after five years. Our results suggest that as capital and talent agglomerate they tend to positively influence growth in neighbouring regions. However, innovation remains a highly local element.</p> <p>Focus on integrated regional policies</p> <p>Agglomeration economies are partly responsible for regional growth. Endogenous sources of growth such as human capital and innovation are more important than a region’s physical distance from markets. Although a region with good accessibility to markets has an added advantage for its growth prospects, these also depend on the presence of human capital, innovation, infrastructure and economies of agglomeration. Proximity among the diverse local actors in a regional innovation system may well be a key ingredient. The performance of neighbouring regions is strongly correlated with a region’s performance, suggesting that inter-regional trade and inter-regional linkages play an important role in regional growth.</p>
--

Source: OECD (2009, pp. 17–18).

6.3 The Australian debate

The Australian Federal election of August 2010 produced a hung parliament with Labor and the Coalition each winning 72 of the 150 seats in the House of Representatives. Labor formed a minority government with the support of four of the six crossbenchers, including an agreement on confidence and supply with two independent members (Tony Windsor and Rob Oakeshott, signed on 7 September 2010). That agreement focused on two issues: parliamentary reform and a commitment to regional Australia (Annex B, p. 2):

This document sets out a commitment to vital investments in infrastructure and services for regional Australia, a commitment to 'place-based thinking' and 'localism' as well as fresh commitments to governance and transparency reform which will ensure that regional Australia gets a fair hearing and a fair return from its national government.

Subsequently, two major reports were released that argued respectively for and against this commitment to place-based thinking. The first report was prepared by John Tomaney commissioned by the Australian Business Foundation and published in November 2010. The second report was written by John Daley and Annette Lancy at the Grattan Institute, released in May 2011. Because both reports were written in the context of Australia's renewed policy focus on regional development, their contrasting conclusions provide a good insight into the key policy issues if a place-based approach is adopted.

Tomaney (2010, p. 6) begins with a summary of the place-based paradigm that had emerged in Europe in particular drawing on sources such as OECD (2009) (see also Tomaney, 2012):

The new paradigm of local and regional development emphasises the identification and mobilisation of endogenous potential, that is, the ability of places to grow drawing on their own resources, notably their human capital and innovative capacities. This approach aims to develop locally-owned strategies that can tap into unused economic potential in all regions and are the basis for strategies that tackle questions of sustainable development and human wellbeing. Such approaches require strong and adaptable local institutions, such as regional development agencies, which are increasingly commonplace around the world. At the same time, such approaches require the involvement of a wide range of stakeholders and mechanisms for identifying assets in the local economy that can be the basis for local growth strategies.

Tomaney warns that the Australian context is quite different from the European context, so that it is not straightforward to draw simple lessons from that paradigm for immediate transfer to Australia. He observes, for example, that "Australia is the most urbanised society in the world, by conventional measures, with its settlement structure dominated by the State capital cities to a degree which is unusual in most European countries" (Tomaney, 2010, p. 25).

Perhaps as a result, 'regional Australia' has come to mean 'non-metropolitan Australia' (Beer et al., 2003, p. xi–xii), which means that 'regional' issues are often discussed separately from 'city' issues, obscuring the degree to which development is shaped by the relationships between rural and metropolitan regions. It also means that metropolitan sub-regions may miss out on the benefits of a place-based approach to their economic development.

Tomaney's final chapter draws six lessons for Australian place-based policy. First, it should be applied in both urban and rural contexts. Second, it requires effective local and regional institutions for assessing a region's socio-economic assets and designing judicious interventions for their development. Third, this will place demands on local business groups, who must contribute to research and analysis rather than simply making demands on public bodies. Fourth, a strong focus on innovation is essential, recognising that the nature of this focus can vary depending on local economic strengths and strategies. Fifth, place-based policy is a long-term process in which stability and longevity of institutions and strategies appears to be a component of their success. Finally, Tomaney suggests that Australia's tradition of fiscal federalism could be supportive of place-based approaches.

Daley and Lancy's (2011) report at the Grattan Institute recognised that Australia spends over A\$2 billion per annum on federal programmes explicitly aimed at promoting regional growth, with more spent on other programmes that include this as an important goal. Their evaluation of these programmes is that they are generally unsuccessful (*idem*, p. 3):

However, the findings of this report show government spending cannot make economic water flow uphill. Local job attraction schemes, regional universities, small scale roads and major infrastructure are all expensive, but they do not appear to materially accelerate slow-growing regions. By not investing in regions where we can get the best return for our taxpayer dollars, we sacrifice higher overall productivity and economic growth.

They go on to say that as well as being inefficient, the policies are inequitable (*ibid*):

Worse, the regional equity approach has treated people unfairly. Governments have tended to divide recurrent and infrastructure funding between regions according to the number of existing residents, and have tended to underinvest in "bolting" regions. Consequently, the people in rapidly growing regions near capital cities and on the coast get substantially less than their fair share of services and infrastructure. It would be fairer and more efficient to allocate more infrastructure funds according to the number of new residents.

The basis of the report's analysis is agglomeration economics discussed in section 5.1 above. The analysis observed that "Australia's capital cities, and regions within an hour or two's drive of them, are generally growing quickly" (*idem*, p. 8). Further, the Australian cities with more than 100,000 residents "contribute nearly 80 percent of GDP, employ 75 percent of the nation's workforce, and generated 81 percent of the new jobs created between 2001 and 2006" (*ibid*, citing Infrastructure Australia, 2010, p. 2).

In contrast, Daley and Lancy (2011, p. 19) observe that lagging areas of Australia perform relatively poorly on each of the four drivers of regional economic growth identified by the OECD's (2009) report summarised in Table 3 above. They argue, however, that a simplistic policy of government investment in infrastructure, human capital and research and development in these areas would risk wasting taxpayer dollars for little economic return.

In particular, the report analyses the track record of Federal programmes for regional development. It comments that projects to provide social infrastructure and equitable access to government services are often described inappropriately as regional economic development projects. It then analyses genuine economic development programmes under four major headings: regional job attraction schemes; decentralisation of government jobs; support for regional universities; and regional infrastructure. They find in all four cases that "regional assistance does not promote economic growth in regions that do not already have a critical mass of population and industry, and a well educated population" (*idem*, p. 42).

The report therefore offers eight recommendations, that the government should (*idem*, p. 7):

- ▶ *Recognise that many regional development programs such as regional universities and local community facilities are in fact subsidies that can only be justified on equity or social grounds rather than because they are likely to drive long-term sustainable economic growth. This may then provoke an honest conversation about what level of service governments are prepared to fund in more remote areas given the costs of servicing them.*
- ▶ *Refocus regional assistance on providing social services rather than trying to promote business and job creation.*
- ▶ *Discontinue regional development programs that cannot be justified purely on equity or social grounds.*
- ▶ *Re-consider whether additional funding to regional universities is justified by social and cultural benefits given limited economic impact.*
- ▶ *Consider providing additional support for regional students to attend higher education in capital cities.*
- ▶ *Increase the priority for service infrastructure and funding in fast-growing bolting regions rather than trying to induce additional growth and relocation of activity back to slower-growing regions.*
- ▶ *Support improvements in long-term growth drivers (education, transport infrastructure, and innovation) where they can accelerate economic growth already underway – generally within 150km of large population centres or where there are natural advantages (such as mining or coastal towns).*
- ▶ *Monitor and evaluate regional development and other growth programs more rigorously and transparently to identify which programs truly make a difference.*

6.4 Conclusion

An interesting feature of the Australian debate discussed in section 6.3 is that the two reports addressed the same institutional framework in that country and drew on the same international literature (particularly OECD, 2009, discussed in section 6.2), yet arrived at very different conclusions. These might be summarised as a recommendation to pay attention to lagging regions because they offer untapped potential for endogenous local development (the Tomaney report) or as a recommendation to concentrate exclusively on fast-growing regions because they have demonstrated they have the critical mass of human capital and industry to develop further (the Daley and Lancy report). This suggests that the debate is not so much about people-based versus place-based policies (both reports emphasise the importance of population and human capital, and that government investment decisions have different impacts on different places), but about what portfolio of place-based policies will be most effective in meeting national efficiency and equity goals.

Conclusion

Chapter 1 explained that this report adopts Amartya Sen's definition of development as "the expansion of the 'capabilities' of persons to lead the kinds of lives they value – and have reason to value" (Sen, 1989, p. 18). The economics literature reviewed in subsequent chapters has highlighted three ways in which countries expand these capabilities:

- ▶ investment in physical capital
- ▶ investment in human capital (education)
- ▶ investment in new knowledge creation and utilisation.

In each case, the investment involves sacrificing some present consumption possibilities as human and other resources are diverted from the production of consumer goods and services into the production of physical capital, human capital or new knowledge. This sacrifice provides an important motivation for ensuring that the citizens of a country make good choices about the levels of investment they make in physical capital, in human capital and in new knowledge, but also for ensuring that the types of investment are well chosen to match the kinds of lives they value and have reason to value.

This requires sound government, political, business and civil institutions that support good decision-making by citizens and enterprises. This report has mentioned in particular the importance of the rule of law for defining and protecting property rights, including the maintenance of a legislative framework for intellectual property that achieves a suitable balance between providing incentives for new knowledge creation and encouraging new knowledge to be widely used in production.

Beyond supporting sound institutions, however, the literature also suggests more direct roles for central governments in coordinating some investment decisions on behalf of citizens and enterprises. In particular, there are sound economic reasons for the government to be involved in infrastructure investments for physical capital, human capital and new knowledge creation and utilisation.

The New Zealand government's investments in these three types of infrastructure are substantial. To give some headline figures from the 2014 Budget documents:

- ▶ The value of state highways (including state highway corridor land) at 30 June 2013 was \$25.9 billion.
- ▶ Total Crown expenses on education for the year ending 30 June 2013 were \$13.4 billion.
- ▶ The government's total funding of science and innovation is expected to reach \$1.5 billion per annum by 2015/16.

The economic rationale for central government involvement in these types of infrastructure investment rests on the standard pillars of efficiency and equity.

- ▶ Efficiency, because these expenditures involve at least an element of the economic theory of public goods meaning that the infrastructure would be underprovided if not subsidised from compulsory taxation.

- ▶ Equity, because access to physical infrastructure, quality education and modern technologies is essential for all communities and their residents, to share in a country's growth of its average standard of living.

Consequently, there is almost universal acceptance of the desirability of suitable 'people-based' policies that aim to give all citizens access to services such as ultra-fast broadband, post-compulsory education and advanced medical treatments, wherever they are located. There is less universal acceptance of place-based policies that aim to improve the economic wellbeing of particular districts or regions, but this report has argued that this debate is really about what forms of place-based policies are most effective in meeting national efficiency and equity goals (see section 6.4 above).

One of the key lessons from the literature, for example, is that there are advantages in integrating decisions about the three types of infrastructure investment. The OECD's report on *How Regions Grow* is very clear on this: "[physical] infrastructure alone has no impact on regional growth, unless regions are endowed with adequate levels of human capital and innovation" and "regional policies which promote infrastructural development will only be successful if human capital and innovation are also present" (see Table 3 in Chapter 6). This makes place-based analysis inevitable, without demanding a particular type of place-based policy.

Instead, a synthesis of the systematic approaches to economic development surveyed in chapter 5 would begin with efforts to understand the different contexts of different places (including their connections to other regions nationally and globally). Each region must search for mechanisms to mobilise local resources that build on the region's particular strengths and opportunities, taking into account their evolution over time.

For some places, the presence of agglomeration economies may be an important element, whereas for others the absence of this element may require investment by the local community in alternative mechanisms for fostering innovation. Some regions may identify one or more clusters of local businesses that can create and sustain a competitive advantage in a global marketplace. Some regions may identify local natural resources that can be extracted to fund investment in local physical and human capital. All regions have to consider how to invest in local amenities that make their place an attractive location for creative people to live and work.

In this context, the New Zealand public sector is an important asset for regions because of its unique ability to gather, synthesise and distribute new knowledge. This is an important public service (in both the economic and civic meanings of that term) emphasised, for example, in Fabrizio Barca's definition of place-based policies for the European Union as "bundles of integrated, place-tailored public goods and services, designed and implemented by eliciting and aggregating local preferences and knowledge through participatory political institutions, and by establishing linkages with other places" (see section 6.2 above).

From the perspective of the international economy, New Zealand is itself an economic region, connected with varying strengths to other regions in the world. The principles for regional development briefly described in the previous three paragraphs can therefore be applied to New Zealand's national economic strategy. This is David Skilling's argument; as a small country New Zealand has the opportunity to develop a clear perspective on how it will compete globally and then develop a consensus on coordinated investments to implement that strategy. Success would result in expanded capabilities of New Zealanders to lead the kinds of lives we have reason to value.

References

- Acemoglu, D., Aghion, P., Bursztyn, L., & Hémous, D. (2012). The environment and directed technological change. *American Economic Review*, 102(1), 131–166.
- Adshade, M. E. (2009) The rich are different from the rest of us: Review article. *Review of Income and Wealth*, 55(4), 959–967.
- Ager, P., & Bruckner, M. (2013) Cultural diversity and economic growth: Evidence from the US during the age of mass migration. *European Economic Review*, 64, 76–97.
- Aghion, P., & Howitt, P. (1992) A model of growth through creative destruction. *Econometrica*, 60(2), 323–351.
- Aghion, P., & Howitt, P. (1998) *Endogenous growth theory*. Cambridge MA: MIT Press.
- Aghion, P., & Howitt, P. (2007) Capital, innovation, and growth accounting. *Oxford Review of Economic Policy*, 23(1) 79–93.
- Aldrich, H. E., & Yang, T. (2014) How do entrepreneurs know what to do? Learning and organizing in new ventures, *Journal of Evolutionary Economics*, 24(1), 59–82.
- Algan, Y., & Cahuc, P. (2010) Inherited trust and growth. *American Economic Review*, 100(5), 2060–2092.
- Amin, A., & Hausner, J. (Eds.) (1997) *Beyond market and hierarchy: Interactive government and social complexity*. Aldershot: Edward Elgar.
- Ang, J., & Madsen, J. (2011) Can second-generation endogenous growth models explain the productivity trends and knowledge production in the Asian Miracle economies? *Review of Economics and Statistics*, 93(4), 1360–1373.
- Arthur, B. (1994) *Increasing returns and path dependence in the economy*. Ann Arbor: University of Michigan Press.
- Aschauer, D. A. (1989) Is public expenditure productive? *Journal of Monetary Economics*, 23(2), 177–200.
- Audretsch, D. B. (2007) Entrepreneurship capital and economic growth. *Oxford Review of Economic Policy*, 23(1), 63–78.
- Baily, M. & Lawrence, R. (2001) Do we have a new E-conomy? *American Economic Review*, 91(2), 308–312.
- Bajona, C., & Locay, L. (2009) Entrepreneurship and productivity: The slow growth of the planned economies. *Review of Economic Dynamics*, 12(3), 505–522.
- Barca, F. (2009). *An agenda for a reformed cohesion policy: A place-based approach to meeting European Union challenges and expectations*. Independent report prepared at the request of Danuta Hübner, Commissioner for Regional Policy. Retrieved from <http://www.europarl.europa.eu/portal/en>

- Barca, F., McCann, P., & Rodríguez-Pose, A. (2012). The case for regional development intervention: Place-based versus place-neutral approaches. *Journal of Regional Science*, 52(1), 134–152.
- Barkley, D. L. (2008). Evaluations of regional competitiveness: Making a case for case studies. *Review of Regional Studies*, 38(2), 121–143.
- Barro, R. J. (2001) Human capital and growth, *American Economic Review*, 91(2), 12–17.
- Bartik, T., Boehm, T., & Schlottmann, A. (2003). The perplexing literature on growth and change. *Review of Regional Studies*, 33(1), 1–16.
- Baxter, C., Campbell, J., Eyre, R., Fitzsimons, J., Gillies, K., Downing, Z., Jones, T., & Penwarden, R. (2014). *Jobs after coal: A just transition for New Zealand communities*. Coal Action Network Aotearoa. Retrieved from <http://coalactionnetworkaotearoa.wordpress.com/jobs-after-coal/>
- Becker, G. (1962). Investment in human capital: A theoretical analysis, *Journal of Political Economy*, 70(5), Part 2, 9–49.
- Becker, G. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. New York: Columbia University Press.
- Beer, A., & Clower, T. (2014). Mobilizing leadership in cities and regions. *Regional Studies, Regional Science*, 1(1), 5–20.
- Beer, A., Houghton, G. & Maude, A. (Eds.) (2003). *Developing locally: An international comparison of local and regional economic development*. Bristol: The Policy Press.
- Beer, A., Maude, A., & Pritchard, B. (2003). *Developing Australia's regions: Theory and practice*. Sydney: University of New South Wales.
- Bils, M., & Klenow, P. (2000). Does schooling cause growth? *American Economic Review*. 90(5), 1160–1183.
- Blakely, N., Lewis, G., & Mills, D. (2005). *The economics of knowledge: What makes ideas special for economic growth?* New Zealand Treasury Policy Perspectives Paper 05/05. Wellington: New Zealand Treasury.
- Blankenau, W., Simpson, N., & Tomljanovich, M. (2007). Public education expenditures, taxation, and growth: Linking data to theory, *American Economic Review*, 97(2), 393–397.
- Boschma, R. A., & Lambooy, J. G (1999). Evolutionary economics and economic geography. *Journal of Evolutionary Economics*, 9(4), 411–429.
- Bowlus, A., & Robinson, C. (2012). Human Capital Prices, Productivity, and Growth, *American Economic Review*, 102(7) 3483–3515.
- Bracalente, B., Perugini, C., & Pompei, F. (2008). What sorts of agglomerations really matter to productivity?: A regional analysis of Europe's manufacturing sector. *Review of Regional*

- Studies, 38(2), 145–172.
- Breton, T. R. (2011). The quality vs. the quantity of schooling: What drives economic growth? *Economics of Education Review*, 30(4), 765–773.
- Brock, W., & Durlauf, S. (2001). Growth empirics and reality, *World Bank Economic Review*, 15(2), 229–272.
- Brown, S., Hayes, K. & Taylor, L. (2003). State and local policy, factor markets, and regional growth. *Review of Regional Studies*, 33(1), 40–60.
- Buchanan, J., & Jakubauskas, M. (2010). The political economy of work and skill in Australia: Insights from recent applied research. In J. Bryson (Ed.) *Beyond Skill: Institutions, Organisations and Human Capability* (pp. 32–57). London: Palgrave Macmillan,.
- Cadot, O., Carrere, C., & Strauss-Kahn, V. (2013). Trade diversification, income, and growth: What do we know? *Journal of Economic Surveys*, 27(4), 790–812.
- Callaghan, P. (2009). *Wool to weta: Transforming New Zealand's culture and economy*. Auckland: Auckland University Press.
- Callaghan, P. (2013) Sustainable economic growth for New Zealand: An optimistic, myth-busting perspective, *TalentNZ*, 1, 99–100.
- Castellacci, F. (2007) Evolutionary and new growth theories: Are they converging? *Journal of Economic Surveys*, 21(3), 585–627.
- Castro, R. (2005). Economic Development and Growth in the World Economy, *Review of Economic Dynamics*, 8(1), 195–230.
- Cerra, V., & Saxena, S. (2008). Growth dynamics: The myth of economic recovery. *American Economic Review*, 98(1), 439–457.
- Chari, A., & Henry, P. (2014) Learning from the doers: Developing country lessons for advanced economy growth. *American Economic Review*, 104(5), 260–265.
- Chatterjee, S., Sakoulis, G., & Turnovsky, S. (2003). Unilateral capital transfers, public investment, and economic growth. *European Economic Review*, 47(6), 1077–1103.
- Ciccone, A., & Papaioannou, E. (2009). Human capital, the structure of production, and growth. *Review of Economics and Statistics*, 91(1), 66–82.
- Coleman, J. (1986). Social capital in the creation of human capital. *American Journal of Sociology*, 94, Supplement, S95–S120.
- Creasey, E., Rahman, A., & Smith, K. (2012). Nation building and economic growth. *American Economic Review*, 102(3), 278–282.
- Crescenzi, R., & Rodríguez-Pose, A. (2012). Infrastructure and Regional Growth in the European Union. *Papers in Regional Science*, 91(3), 487–513.
- Crocombe, G. T., Enright, M. J., & Porter, M. E. (1991). *Upgrading New Zealand's competitive*

advantage. Auckland: Oxford University Press.

- Daley, J., & Lancy, A. (2011). *Investing in regions: Making a difference*. Melbourne: Grattan Institute.
- Dalgaard, C. J., & Strulik, H. (2013). The history augmented Solow model. *European Economic Review*, 63, 134–149.
- Dalziel, P. (2014). Education and qualifications as skills. In J. Buchanan, D. Finegold, K. Mayhew & C. Warhurst (Eds.) *The Oxford Handbook of Skills and Training*. Oxford: Oxford University Press, forthcoming.
- Dalziel, P., & Saunders, C. (2014). *Wellbeing economics: Future directions for New Zealand*. Wellington: Bridget Williams Books.
- Dasgupta, P. & Heal, G. (1974). The optimal depletion of exhaustible resources. *Review of Economic Studies*, 41(1), 3–28.
- Davis, G., & Vasquez Cordano, A. (2013). International trade in mining products. *Journal of Economic Surveys*, 27(1), 74–97.
- De Soto, H. (2000) *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. New York: Basic Books.
- Dosi, G., & Nelson, R. R. (1994). An introduction to evolutionary theories in economics. *Journal of Evolutionary Economics*, 4(3), 153–172.
- Durlauf, S., Kourtellos, A., & Minkin, A. (2001). The local Solow growth model. *European Economic Review*, 45(4–6), 928–940.
- Eaton, J., & Kortum, S. (2001) Technology, trade, and growth: A unified framework. *European Economic Review*, 45(4–6) 742–755.
- Estevadeordal, A., & Taylor, A. (2013). Is the Washington Consensus dead? Growth, openness, and the great liberalization, 1970s–2000s. *Review of Economics and Statistics*, 9(5), 1669–1690.
- European Commission (2008). EU cohesion policy 1988–2008: Investing in Europe’s future [Special issue]. *Inforegio Panorama*, No 26. Retrieved from: http://ec.europa.eu/regional_policy/sources/docgener/panorama/pdf/mag26/mag26_en.pdf.
- Fatas, A., & Mihov, I. (2013). Policy volatility, institutions, and economic growth, *Review of Economics and Statistics*, 95(2), 362–376.
- Finegold, D. (1999). Creating self-sustaining, high-skill ecosystems. *Oxford Review of Economic Policy*, 15(1), 60–81.
- Fischer, S. (2003). Globalization & its challenges. *American Economic Review*, 93(2), 1–30.
- Florida, R. (2002) *The rise of the creative class: And how it’s transforming work, leisure, community and everyday life*. New York: Perseus Book Group.

- Folster, S., & Henrekson M. (2001). Growth effects of government expenditure and taxation in rich countries. *European Economic Review*, 45(8), 1501–1520.
- Folster, S., & Henrekson, M. (2006). Growth effects of government expenditure and taxation in rich countries: A reply. *European Economic Review*, 50(1), 219–221.
- Fukuyama, F. (1995) *Trust: The social virtues and the creation of prosperity*. New York: Free Press.
- Garcia-Belenguer, F., & Santos, M. (2013). Investment rates and the aggregate production function. *European Economic Review*, 63, 150–169.
- Garcilazo, E., & Oliveira Martins, J. (2013). *The contribution of regions to aggregate growth in the OECD*. OECD Regional Development Working Papers, 2013/28. Paris: OECD Publishing. [doi 10.1787/5k3tt0zpz932-en](https://doi.org/10.1787/5k3tt0zpz932-en).
- Glaeser, E. L. (2008) *Cities, Agglomeration and Spatial Equilibrium*. Oxford: Oxford University Press.
- Glaeser, E. L., & Gottlieb, J. D. (2008). The economics of place-making policies. *Brookings Papers on Economic Activity, Spring*, 1, 155–239.
- Gorodnichenko, Y., & Roland, G. (2011). Which dimensions of culture matter for long-run growth? *American Economic Review*, 101(3) 492–498.
- Gradstein, M., & Justman, M. (2002). Education, social cohesion, and economic growth. *American Economic Review*, 92(4), 1192–1204.
- Gramlich, E. M. (1994). Infrastructure investment: A review essay. *Journal of Economic Literature*, 32(3), 1176–1196.
- Grimes, A. (2009). *The role of infrastructure in developing New Zealand's economy*. Motu Note No. 1, Motu Economic and Public Policy Research, Wellington. Retrieved from http://www.motu.org.nz/publications/detail/motu_note_1
- Grimes, A. (2010). *The economics of infrastructure investment: beyond simple cost benefit analysis*. Motu Working Paper 10-05, Motu Economic and Public Policy Research, Wellington. Retrieved from http://www.motu.org.nz/publications/detail/the_economics_of_infrastructure_investment
- Grimes, A. (2013). Infrastructure and regional economic growth. In M. M. Fischer & P. Nijkamp (Eds.), *Handbook of Regional Science*. Berlin: Springer-Verlag.
- Gunasekara, C. (2006). Reframing the role of universities in the development of regional innovation systems. *Journal of Technology Transfer*, 31(1), 101–113.
- Gundlach, E. (2007). The Solow model in the empirics of growth and trade. *Oxford Review Of Economic Policy*, 23(1), 25–44.
- Gylfason, T., Herbertsson, T., & Zoega, G. (2001). Ownership and growth. *World Bank Economic Review*, 15(3), 431–449.
- Ha, J., & Howitt, P. (2007). Accounting for trends in productivity and R&D: A Schumpeterian critique of

- semi-endogenous growth theory. *Journal of Money, Credit and Banking*, 39(4), 733–744.
- Hansen, G., & Prescott, E. (2002). Malthus to Solow. *American Economic Review*, 92(4), 1205–1217.
- Hanushek, E., & Kimko, D. (2000). Schooling, labor-force quality, and the growth of nations. *American Economic Review*, 90(5), 1184–1208.
- Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of Economic Literature*, 46(3), 607–668.
- Hendy, S., & Callaghan, P. (2013). *Get off the grass: Kickstarting New Zealand's innovation economy*. Auckland: Auckland University Press.
- Henry, P. (2003). Capital-account liberalization, the cost of capital, and economic growth. *American Economic Review*, 93(2), 91–96.
- Howitt, P. (1999). Steady endogenous growth with population and R&D inputs growing. *Journal of Political Economy*, 107(4), 715–30.
- Infrastructure Australia (2010). *State of Australian cities 2010*. Canberra: Infrastructure Australia.
- Inwood, K. (2002) Economic growth and global inequality in long run perspective: Review article. *Review of Income and Wealth*, 48(4), 581–593.
- Iyigun, M., & Owen, A. (2006). Experiencing change and the evolution of adaptive skills: Implications for economic growth. *European Economic Review*, 50(3), 565–579.
- Jones, C. I. (1995a). R & D models of economic growth. *Journal of Political Economy*, 103(4), 759–784.
- Jones, C. I. (1995b). Time series tests of endogenous growth models. *Quarterly Journal of Economics*, 110(2), 495–525.
- Jones, C. I., & Vollrath, D. (2013). *Introduction to Economic Growth* (3rd ed.). New York: W. W. Norton.
- Keynes, J. M. (1936). *The general theory of employment, interest and money*. London: Macmillan.
- Knowles, S., & Owen, P. D. (1995). Health capital and cross-country variation in income per capita in the Mankiw-Romer-Weil model. *Economics Letters*, 48(1), 99–106.
- Kruger, J. J. (2008). Productivity and structural change: A review of the literature. *Journal of Economic Surveys*, 22(2), 330–363.
- Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, 99(3), 483–499.
- Krugman, P. (2008). The increasing returns revolution in trade and geography. In K. Grandin (Ed.), *The Nobel Prizes 2008* (pp. 335–348). Stockholm: Nobel Foundation, 2009.
- Kumar, S., & Russell, R. (2002). Technological change, technological catch-up, and capital deepening: Relative contributions to growth and convergence. *American Economic*

Review, 92(3), 527–548.

- Le, T., Scobie, G. M., & Gibson, J. K. (2009). Are Kiwis saving enough for retirement: Evidence from SoFIE. *New Zealand Economic Papers*, 43(1), 3–20.
- Li, W., & Sarte, P. (2004). Progressive taxation and long-run growth. *American Economic Review*, 94(5), 1705–1716.
- Lin, B. (2006). A sustainable perspective on the knowledge economy: A critique of Austrian and mainstream views. *Ecological Economics*, 60(1), 324–332.
- MacDonald, R. (2010). Real gross domestic income, relative prices, and economic performance across the OECD. *Review of Income and Wealth*, 56(3), 498–518.
- MacLeod, W. (2013). On economics: A review of *Why Nations Fail* by D. Acemoglu and J. Robinson and *Pillars of Prosperity* by T. Besley and T. Persson. *Journal of Economic Literature*, 51(1), 116–143.
- Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2), 407–437.
- Martin, P. & C. Rogers (2000). Long-term growth and short-term economic instability. *European Economic Review*, 44(2), 359–381.
- Matsen, E., & Torvik, R. (2005). Optimal Dutch disease. *Journal of Development Economics*, 78(2), 494–515.
- McAdam, P., & Allsopp, C. (2007). The 50th anniversary of the Solow growth model. *Oxford Review of Economic Policy*, 23(1), 1–2.
- McCann, P. (2009). Economic geography, globalisation and New Zealand's productivity paradox. *New Zealand Economic Papers*, 43(3), 279–314.
- McGuinness, W. (2013). *Editorial*. TalentNZ, Issue 1. Wellington: McGuinness Institute.
- Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy*, 66(4), 281–302.
- Mueller, H. (2012) Growth dynamics: The myth of economic recovery: Comment. *American Economic Review*, 102(7), 3774–3777.
- Mukand, S., & Rodrik, D. (2005). In search of the Holy Grail: Policy convergence, experimentation, and economic performance. *American Economic Review*, 95(1), 374–383.
- National Infrastructure Unit (2011). *National Infrastructure Plan 2011*. Wellington: National Infrastructure Unit. Retrieved from <http://www.infrastructure.govt.nz/plan/2011/nip-jul11.pdf/view?searchterm=national%20infrastructure%20plan%202011>
- Nelson, R. R., & Winter, S. G. (1974). Neoclassical vs. evolutionary theories of economic growth: Critique and prospectus. *Economic Journal*, 84(336), 886–905.
- Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Cambridge MA:

Belknap Press.

New Zealand Government (2011). *Connecting New Zealand: A summary of the government's Policy Direction for Transport*. Wellington: Ministry of Transport.

New Zealand Government (2014a) *Business growth agenda future direction 2014*. Wellington: Ministry of Business, Innovation and Employment.

New Zealand Government (2014b). *Regional economic activity report 2014*. Wellington: Ministry of Business, Innovation and Employment.

North, D. C. (1987). Institutions, transaction costs and economic growth. *Economic Inquiry*, 25(3), 419–428.

Nussbaum, M. (2011). *Creating capabilities: The human development approach*. Cambridge, MA: Belknap Press.

O'Riley, B. (2014). *Future-focused learning in connected communities*. A report by the 21st century learning reference group chaired by Brett O'Riley. Wellington: Ministry of Education.

OECD (2003). *Economic survey: New Zealand*. Paris: Organisation for Economic Cooperation and Development.

OECD (2006). *Competitive cities in the global economy*. Paris: Organisation for Economic Cooperation and Development.

OECD (2009). *How Regions Grow: Trends and Analysis*. Paris: Organisation for Economic Cooperation and Development.

OECD (2010). *The OECD innovation strategy: Getting a head start on tomorrow*. Paris: OECD Publishing. doi: [10.1787/9789264083479-en](https://doi.org/10.1787/9789264083479-en).

OECD (2011) *Regions and innovation policy*. OECD Reviews of Regional Innovation. Paris; OECD Publishing. doi: [10.1787/9789264097803-en](https://doi.org/10.1787/9789264097803-en).

OECD (2006b). *Policy framework for investment*. Paris: Organisation for Economic Cooperation and Development.

Peer, V. & Penker, M. (2014). Higher education institutions and regional development: A meta-analysis. *International Regional Science Review*. Published online. doi: 10.1177/0160017614531145.

Perera-Tallo, F. (2003). Growth due to globalization. *International Economic Review*, 44(2), 651–676.

Phillipson, N. (2010). *Adam Smith: An enlightened life*. London: Allen Lane.

Pintea, M., & Thompson, P. (2007). Technological complexity and economic growth. *Review of Economic Dynamics*, 10(2), 276–293.

Pohjola, M. (2002). The new economy in growth and development, *Oxford Review of Economic Policy*, 18(3), 380–396.

- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York: The Free Press.
- Porter, M. E. (1998). *The competitive advantage of nations* (2nd ed.) New York: The Free Press.
- Prati, A., Onorato, M., & Papageorgiou, C. (2013). Which reforms work and under what institutional environment? Evidence from a new data set on structural reforms. *Review of Economics and Statistics*, 95(3), 946–968.
- Prescott, E. C. (2002). Richard T. Ely lecture: prosperity and depression. *American Economic Review*, 92(2), 1–15.
- Putnam, R. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.
- Putnam, R., Leonardi, R., & Nanetti, R. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton: Princeton University Press.
- Ramondo, N., & Rodriguez-Clare, A. (2010). Growth, size, and openness: A quantitative approach. *American Economic Review*, 100(2), 62–67.
- Reddell, M. (2013, March). *The long-term level “misalignment” of the exchange rate: Some perspectives on causes and consequences*. Paper presented at a Reserve Bank of New Zealand and Treasury joint forum, Wellington. Retrieved from http://www.rbnz.govt.nz/research_and_publications/seminars_and_workshops/Mar2013/5200824.pdf
- Reinhart, C., & Rogoff, K. (2010). Growth in a time of debt, *American Economic Review*, 100(2), 573–578.
- Ricardo, D. (1817). *On the principles of political economy and taxation*. London: John Murray.
- Rivas, L. A. (2003). Income taxes, spending composition and long-run growth. *European Economic Review*, (47)3, 477–503.
- Rodrik, D. (2006). Goodbye Washington Consensus, hello Washington confusion? A review of the World Bank's economic growth in the 1990s: Learning from a decade of reform. *Journal of Economic Literature*, 44(4), 973–987.
- Rodrik, D., Subramanian, A., & Trebbi, F. (2004). Institutions rule: The primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, 9(2), 131–65.
- Roe, M., & Siegel, J. (2009). Finance and politics: A review essay based on Kenneth Dam's analysis of legal traditions in the law-growth nexus. *Journal Of Economic Literature*, 47(3), 781–800.
- Rogers, C. (2007). Whither decentralization: Implications for linking research and practice: Presidential Address: Southern Regional Science Association, April 2006. *Review of Regional Studies*, 37(2), 109–119.

- Rogers, M. (2008). Directly unproductive Schooling: How country characteristics affect the impact of schooling on growth. *European Economic Review*, 52(2), 356–385.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5) Part 2, S71–S102.
- Romer, P. M. (1994). The origins of endogenous growth. *Journal of Economic Perspectives*, 8(1), 3–22.
- Romer, P. M. (2001). Comment on 'It's not factor accumulation: Stylized facts and growth models,' by William Easterly and Ross Levine. *World Bank Economic Review*, 15(2), 225–227.
- Rossi-Hansberg, E., & Wright, M. (2007). Urban structure and growth. *Review of Economic Studies*, 74(2), 597–624.
- Rowe, J. E. (Ed) (2005). *Economic development in New Zealand*. Aldershot: Ashgate.
- Rowe, J. E. (Ed) (2009). *Theories of local economic development: Linking theory to practice*. Farnham: Ashgate.
- Sachs, J., & Warner, A. (2001). The curse of natural resources. *European Economic Review*, 45(4–6), 827–838.
- Sala-i-Martin, X., Doppelhofer, G., & Miller, R. (2004). Determinants of long-term growth: A Bayesian averaging of classical estimates (BACE) approach. *American Economic Review*, 94(4), 813–835.
- Samila, S., & Sorenson, O. (2011). Venture capital, entrepreneurship, and economic growth. *Review of Economics and Statistics*, 93(1), 338–349.
- Schumpeter, J. (1943). *Capitalism, socialism and democracy*. London: George Allen and Unwin.
- Sen, A. (1989). *Development as freedom*. Oxford: Oxford University Press.
- Shleifer, A. (2009). The age of Milton Friedman. *Journal of Economic Literature*, 47(1), 123–135.
- Shultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51(1), 1–17.
- Sianesi, B., & Van Reenen, J. (2003). The returns to education: Macroeconomics. *Journal of Economic Surveys*, 17(2), 157–200.
- Sirimaneetham, V., & Temple, J. (2009). Macroeconomic stability and the distribution of growth rates. *World Bank Economic Review*, 23(3), 443–479.
- Skilling, D. (2012a). *In uncertain seas: Positioning small countries to succeed in a changing world*. Landfall Strategy Group Working Paper. Retrieved from <http://landfallstrategy.com/discussion-papers/small-countries/>
- Skilling, D. (2012b, May). *There is no such thing as domestic policy*. Presentation to the New Zealand

Treasury. Retrieved from <http://www.treasury.govt.nz/publications/media-speeches/guestlectures/skilling-may12>

- Smith, A. (1904). *An enquiry into the nature and causes of the wealth of nations*. In E. Cannan (Ed.). [University Paperbacks edition]. London: Methuen. (Original work published 1776).
- Solid Energy (2013). *Statement of corporate intent for three years commencing 1 July 2013*. Christchurch: Solid Energy.
- Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65–94.
- Solow, R. M. (1970). *Growth theory*. Oxford: Oxford University Press.
- Solow, R. M. (2007). The last 50 years in growth theory and the next ten. *Oxford Review of Economic Policy*, 23(1), 3–14.
- Spiezia, V., & Weiler, S. (2007). Understanding regional growth. *Review of Regional Studies*, 3()3, 344–366.
- Stiglitz, J., Sen, A., & Fitoussi, J. P. (2009). *Report by the commission on the measurement of economic performance and social progress*. Retrieved from www.stiglitz-sen-fitoussi.fr.
- Stimson, R., Stough, R., & Salazar, M. (2009). *Leadership and institutions in regional endogenous development*. Cheltenham: Edward Elgar.
- Storper, M. (1997). *The Regional World: Territorial Development in a Global Economy*. New York: Guilford Press.
- Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record*, 32, 334–361.
- Savings Working Group (2011). *Saving New Zealand: Reducing vulnerabilities and barriers to growth and prosperity*. Wellington: Savings Working Group. Retrieved from <http://www.treasury.govt.nz/publications/reviews-consultation/savingsworkinggroup/media-1feb11>
- Taylor, J., & Dalziel, P. (2002). *Principles of macroeconomics – New Zealand edition*. Milton: Wiley.
- Teles, V., & Cesar Mussolini, C. (2014). Public debt and the limits of fiscal policy to increase economic growth. *European Economic Review*, 66, 1–15.
- Temple, J. (2002). The assessment: The new economy. *Oxford Review of Economic Policy*, 18(3), 241–264.
- Temple, J. W. (2001). Generalizations that aren't? Evidence on education and growth. *European Economic Review*, 45(4–6), 905–918.
- Tomaney, J. (2010). *Place-based approaches to regional development: Global trends and Australian implications*. Sydney: Australian Business Foundation.
- Tomaney, J. (2012). Is there a case for regional policy in Australia? *Australasian Journal of Regional Studies*, 18(1), 150–156.

- Torvik, R. (2009). Why do some resource-abundant countries succeed while others do not? *Oxford Review of Economic Policy*, 25(2), 241–256.
- Treasury (2014). *Budget economic and fiscal update 2014 additional information*. Wellington: New Zealand Treasury. Retrieved from <http://purl.oclc.org/nzt/b-1639>.
- van Ark, B. (2002). Measuring the new economy: An international comparative perspective. *Review of Income and Wealth*, 48(1), 1–14.
- Venturini, F. (2012). Looking into the black box of Schumpeterian growth theories: An empirical assessment of R&D races. *European Economic Review*, 56(8), 1530–1545.
- Wacziarg, R., & Welch, K. (2008). Trade liberalization and growth: New evidence. *World Bank Economic Review*, 22(2), 187–231.
- Webb, C. J., & Grant, C. (2003). *Economic transformation: An implementation framework*. Tertiary Education Commission Research Paper. Wellington: Tertiary Education Commission.
- Whiteley, P. F. (2000). Economic growth and social capital. *Political Studies*, 48(3), 443–466.
- Winger, A. R. (2000). Regional growth in the 'new' economy. *Review of Regional Studies*, 30(1), 27–41.
- World Bank (2009). *Reshaping economic geography: Economic development report 2009*. Washington DC: World Bank.
- Wolf, A. (2004). Education and economic performance: Simplistic theories and their policy consequences. *Oxford Review of Economic Policy*, 20(2), 315–333.
- Xu, G. (2011). The role of law in economic growth: A literature review. *Journal of Economic Surveys*, 25(5), 833–871.
- Young, A. (1998). Growth without scale effects. *Journal of Political Economy*, 106(1), 41–63.

Appendix

List of Journals

The following journals rated A* or A by the Australian Business Deans Council provided the articles considered in this literature review.

American Economic Review

Australian Economic History Review

Ecological Economics

Economic History Review

Economics of Education Review

European Economic Review

International Economic Review

Journal of Economic Literature

Journal of Economic Surveys

Oxford Review of Economic Policy

Review of Economic Dynamics

Review of Economic Studies

Review of Economics and Statistics

Review of Income and Wealth

Review of Regional Studies

World Bank Economic Review

Disclaimer

All reasonable endeavours are made to ensure the accuracy of the information in this report. However, the information is provided without warranties of any kind including accuracy, completeness, timeliness or fitness for any particular purpose.

The Ministry of Transport excludes liability for any loss, damage or expense, direct or indirect, and however caused, whether through negligence or otherwise, resulting from any person or organisation's use of, or reliance on, the information provided in this report.

Under the terms of the New Zealand Creative Commons Attribution 3.0 (BY) licence, this document, and the information contained within it, can be copied, distributed, adapted and otherwise used provided that:

- ▶ the Ministry of Transport is attributed as the source of the material
- ▶ the material is not misrepresented or distorted through selective use of the material
- ▶ images contained in the material are not copied.

The terms of the Ministry's Copyright and disclaimer apply.