The Resource Boom and Regional Development in Western Australia

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All preparation of fieldwork materials, data collection, and analyses were carried out by Rachel Chapman. The contribution of Rachel Chapman to the writing portion of each publication is outlined below.

List of Publications


This paper forms Chapter 3 in its entirety. Contribution by Chapman: 70%


This paper forms Chapter 4 in its entirety. Contribution by Chapman: 70%


This paper forms Chapter 5 in its entirety. Contribution by Chapman: 70%

Chapman, R., M, Tonts, and P., Plummer. 2015 Drivers of Growth in a Spatially Unequal Landscape. (Prepared for submission to *Growth and Change*)

This paper forms Chapter 6 in its entirety. Contribution by Chapman: 60%


This paper forms Chapter 7 in its entirety. Contribution by Chapman: 70%

Matthew Tonts (Coordinating Supervisor)     Rachel Chapman
Abstract

This study looks at the period between 2001 and 2011 to explore the various ways that the recent ‘mining boom’ in Western Australia has impacted people and communities. It examines the implications of rapid resource-led growth on rural and remote localities across the State, and how the impacts vary across space and time. It does this through a series of published papers that examine: i) the ways in which communities adjust to the establishment of major new resource projects; ii) the ‘lived experiences’ of residents in rapidly growing resource communities and comparing the experiences between different places; iii) how socioeconomic wellbeing varies from place-to-place and over time; iv) how local competitiveness affects uneven socioeconomic performance across mining communities; and v) how the mining industry is impacting selected non-mining communities. A mixed-methods approach drawing on both qualitative and quantitative techniques was used to address the multi-faceted nature of these topics. Methods included content analysis, semi-structured interviews, Q-methodology, and statistical analysis.

This thesis draws attention to the diverse experiences of resource communities in Western Australia across both space and time. While a common suite of global economic processes contributed to Western Australia’s recent resource boom, the study showed that local context ‘matters’ and is important in helping to explain the spatially uneven performance of mining communities. These place-based factors included local company structure, the commodity being extracted, remoteness and local competitiveness. Moreover, local policy responses were also critical in shaping the ways in which communities adjusted to rapid resource-led growth. Yet, despite the importance of local context in shaping variability, the study shows that global economic processes were the main drivers of growth and change. Indeed, there is evidence to suggest that these became increasingly important as the boom persisted, often overwhelming local factors. The study also highlights the increasingly complex regional spatial linkages associated with the resource industry. Changing labour practices saw a number of traditionally non-mining towns drawn more into the resource economy, contributing to new spatial interdependencies within regional Western Australia. Collectively, these shifts have begun to transform the nature of regional development in Western Australia and have contributed to new dynamic and complex policy and planning concerns.
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Chapter 1: Introduction

1.1 Introduction

The dynamic nature of resource-dependent communities has long been of interest to social scientists (Barnes and Hayter, 2005; Ville and Wicken, 2013). While early studies tended to focus on aspects of local social structure and were influenced largely by the ‘community studies’ research tradition in sociology and anthropology (Dennis et al., 1956; Oxley, 1978; Walker, 1945; Williams, 1981), recent studies have considered a more complex range of multi-scalar processes that integrate individuals and communities into global economic systems (Argent, 2013; Coe et al., 2004; Dyster and Meredith, 2012; Hayter, 2000; Heisler and Markey, 2014). In Australia, the ways in which rural communities have been affected by these processes has been a subject of growing interest, particularly given the rapid expansion of resource extraction during the first decade of the twenty-first century (Baum et al., 2006; Cleary, 2011; Commonwealth of Australia, 2013; Fleming and Measham, 2015; Rolfe and Kinnear, 2013; Tonts et al., 2012). The vast majority of this extraction occurs in rural and remote regions, and has been critical in reshaping the economic and social geographies of these places. Against this background, the purpose of this thesis is to examine how rural and remote communities in Western Australia have been affected by rapid resource-led development.

The thesis is set within the context of growing levels of global economic integration and the emergence of intricate networks of production, trade and consumption (Dicken, 1986; Smith et al., 1991). The dynamic and extensive nature of these networks has led to increasingly complex interactions between places (Amin, 2002; Chandler, 1977; Sassen, 2002). This is particularly evident in the global resource sector, where the networks of production, processing and consumption are expansive and rapidly changing (Bridge, 2008; Coe et al., 2004; Coe and Hess, 2013). Indeed, one of the characteristics of the resource sector is that production often occurs in localities far removed from sites of processing and consumption. Moreover, production is often volatile and shaped by the finite nature of most mineral and energy resources, global economic conditions, geopolitics and notions of ‘comparative advantage’ (Gunton, 2003; Markey et al., 2006; McElroy, 2015). It is this
volatility and its local impacts that have often been of interest to geographers and other social scientists (Haslam-McKenzie, 2009; McDonald et al., 2012; Pini et al., 2010; Ryser et al., 2014; Wilson, 2004). One of the themes that has emerged from this work is the diversity in how places are impacted by, cope with, and respond to resource development. Despite similar economic processes driving resource extraction at global and national scales, the extent to which certain impacts are felt and the ways in which localities react to these changes vary from place-to-place due to unique local characteristics and the specific ways in which places are integrated into multi-scalar networks (Nord and Luloff, 1993; Randall and Ironside, 1996; Reeson et al., 2012; Tonts et al., 2012). These studies point to the importance of a range of place-based factors, including the geological availability of resources, engineering complexity, remoteness of operations, and cost of transporting commodities to markets. Ultimately, the lack of control over the quality, quantity, location, price, and, to some extent, production costs contributes to differential levels of production, returns and socioeconomic conditions across different localities (Randall and Ironside, 1996).

The specific social and economic characteristics of mining towns are also critical in explaining their diverse development trajectories. These themes have been explored in considerable depth in a number of contexts, though most notably in North America. In many cases, mining towns are located in rural and remote areas with few other industries or economic opportunities (Freudenburg, 1992; Hayter, 2000; Randall and Ironside, 1996; Stedman et al., 2004; Wilson, 2004). This means that they are exposed to the cyclical nature of the resource economy, with periods of rapid growth, stability and decline often evident (Bradbury and St. Martin, 1983; Halseth, 1999a). Indeed, Wilson (2004) refers to mining towns ‘riding the resource roller coaster’ and points to a range of associated social and economic challenges. These include a highly mobile labour force (Halseth, 1999a), periods of unemployment and poverty (Freudenburg and Wilson, 2002; Lucas, 1971), service and infrastructure shortfalls at times of rapid growth (Gilmore and Duff, 1975), and the potential for social upheaval and discontent (Kohrs, 1974; Little, 1977; Nelson, 2001; O’Connor, 2015; Smith et al., 2001; Weber and Howell, 1982).

While an extensive body of literature has considered these themes in North America, it remains a surprisingly marginal field of social inquiry in other parts of the developed world, particularly within Australia. This is all the more unusual when the importance of mining to both the country’s economic performance and the geography of settlement are taken into
account (Blainey, 1993; McDonald et al., 2012). Only recently have scholars begun to look more closely at the economic, social and political dimensions of resource extraction in Australia (Carrington and Pereira, 2011; Fleming and Measham, 2015; Kotev and Rolfe, 2014; Lawrie et al., 2011; Reeson et al., 2012; Storey 2001, 2010). Much of this work has emerged in response to the recent ‘resource boom’, which has seen increasing public and policy concerns about the social and economic impacts of increasing levels of resource extraction in rural and remote areas (Commonwealth of Australia, 2013; Western Australia Planning Commission, 2011). This thesis aims to contribute further to knowledge in this area by offering a series of five papers that explore the implications of increasing resource extraction on Australian rural and remote communities. The papers have been published as a number of refereed journal articles and book chapters, and are designed to provide a set of ‘stand alone’ but complementary analyses of the interplay between resource extraction and local community wellbeing and adaptation.

1.2 Aims and Objectives

The overall aim of this thesis is to examine the implications of rapid resource-led development in rural and remote communities in Western Australia. It considers impacts of both broad, global scale processes and place-based characteristics in understanding how communities have experienced the ‘resource boom’ of the early twenty-first century. In order to address the overall aims of this research, chapters three to seven comprise the published papers that address the following objectives:

i. To understand how governments respond to rapid resource-led development, particularly in terms of the provision of key services and infrastructure.

ii. To examine local residents’ experiences and perceptions of rapid resource-led development, and to consider how and why these vary between communities.

iii. To explore temporal and spatial variability in socioeconomic performance across a selection of mining towns and to identify factors that contribute to this variability.
iv. To examine the role of local competitiveness in shaping the temporal and spatial variability in the economic development of mining towns.

v. To assess how the rapid growth of mining is impacting communities that traditionally have had little or no historic involvement with the mining industry.

1.3 Background and Context

1.3.1 The Globalised Economy

The modern capitalist economy is characterised by increasing globalisation and growing connectivity between places (Chandler, 1977; Sassen, 2002). Improved communication technologies and falling transportation costs allow individual functions within the production process (e.g. management, extraction, processing) to occur in different places, based on the spatial, functional and natural assets of that locality (Plate 1.1) (Dicken, 1986; Gunton, 2003). This complicates the spatial and economic relationships between places as localities become integrated into economic activities occurring at wider spatial scales. Indeed, Jessop (2000) notes that globalisation emphasises the importance of understanding spatial relations and interdependencies. Yet, much of the contemporary literature on understanding complex global networks and how these affect localities tends to overlook resource peripheries (Hayter et al., 2003), usually in favour of core metropolitan regions (e.g. Derudder et al., 2010; Taylor, 1997, 2000). This is despite the resource sector being an integral part of global economic systems (Bridge, 2008).

There is also a tendency in much of the literature on globalisation to downplay the role of place and scale (Castells, 2000; O’Brien, 1992; Omae, 1995). As a result, globalisation is sometimes conceived as occurring ‘everywhere’ and ‘nowhere’ simultaneously (Yeung, 1998). However, the concept of globalisation and development cannot be completely devoid of a consideration of ‘place’ and spatial context. While the networks that globalisation create may transcend political boundaries, they connect real places through the processes, power relations, and decisions that occur in each node or locality within that network (Massey, 1979). As a result, even small and/or remote places, including many of those linked to the resources sector, become firmly entrenched in the global economy. These places are where the global economic structure ‘touches the ground’. Processes occurring at international, national, state, and regional scales are unable to conceptualised in any
mutually exclusive way, or as a simple ‘nested hierarchy’, as they generate new interactions between different spatialities (Amin, 2001; Brenner 1999; Hayter 2000; MacKinnon, 2011; Yeung, 1998). The economies of these localities are not autonomous, but are regulated by the multi-scalar networks of which they are a part. How a locality is positioned within these networks often reflects its geography and can shape the amount of control that a place retains over its economy (Bradbury, 1979; Hayter et al., 2003; McCann, 2008).

Plate 1.1: A train carrying iron ore to a port in the Pilbara region demonstrates the integral role that transportation networks played in economic development. Photo by Rachel Chapman, 2012.

The growing interdependencies between places is in large part due to the segregation of functions and the utilisation of expanding communication and transportation networks throughout the production process (Henderson et al., 2002). This allows for investment, management and production decisions to be made in centralised places. The location of these activities in transportation and communication hubs concentrates control and allows for downward diffusion of power, decisions and innovations. These powerful places are both functionally and spatially distant from other localities, yet the decisions made in these centres directly affect all subsequent processes in the production network (Bradbury, 1979; Bridge, 2008; Gonick, 1975; MacKinnon, 2013). The centralisation of management diminishes the amount of local control retained in production or extraction regions, which are often in decentralised locations (Argent, 2013; McCann, 2008; Peck, 2000; Yeung, 2000).
This organisation of networks is sometimes claimed to leave production regions vulnerable and exposes them to volatile economic conditions (Bridge, 2008). While control and decision-making functions are centralised and fairly secure, production is mobile. A firm’s networks provide them with the flexibility to relocate select functions within their operations from place to place based on aspects such as price, quality and regulatory environment (Peck, 2000; Sunley, 2000). The decentralised production and extraction regions often retain little real control, leading to competition between places to provide the most favourable conditions and attract economic activity (Markey et al., 2008; Massey, 1984; Tonts et al., 2013). Resource regions are particularly vulnerable in these processes, as their assets are spatially fixed and limited by physical geography (Freudenburg, 1992).

The number and types of networks operating in a location are due to the particular resources available in a given place. The exact way in which a specific place is integrated into the broader economic system creates a unique set of interdependent and multi-scalar relationships. This, in turn, leads to uneven levels of economic development, as town are impacted and react in different ways to changes in economic conditions and decisions elsewhere (Markusen, 1977; Massey, 1979; McCann, 2008). Uneven economic development, therefore, is not purely due to the geography of a region, but also to the nature of their relationships with other places.

The role that networks and physical geography play in uneven development is perhaps most apparent in resource-dependent communities. Resource-based economies are rooted in the fixed physical assets of that specific location, but are typically subject to the external control of a firm from which they are spatially displaced (Fleming and Measham, 2015; Massey, 1979; McCann 1998, 2008). This subjects them to unequal levels of power, control and benefit, as they become increasingly integrated into multiple scales of economic activity.

1.3.2 Resource-dependent Communities

The effect [of large firms] on individual resource towns was to make them part of an international economy in which their raison d’être was subject to decisions made by centralized corporate bureaucracies and subject as well to the vagaries and fluctuations of commodity prices (Bradbury, 1979, p. 152).

The geographical separation of places of resource extraction and centralised nodes of power has the potential to both contribute to and perpetuate unequal economic development
This relationship has been conceptualised by scholars in numerous and
diverse ways. Resource areas are often referred to as being ‘peripheral’ in relation to a
metropolitan ‘core’ (Barnes et al., 2001; Gunton, 2003). This is seen in both a geographical
sense and in terms of distribution of power and control over local economic processes.
Alternatively, McCann (1998) describes the resource ‘hinterland’ supplying the ‘heartland’
(see also Carson, 2011). This interpretation conceptualises peripheral areas as subordinate
to core areas where capital and power accumulate. Markey et al. (2008) and Tonts et al.
(2013) discuss these peripheral areas as ‘resource banks’, where latent capital is stored.
Uneven development occurs as this capital is withdrawn for the benefit of core areas, with
little reinvestment returning to the periphery. Markusen (1996) described these as being
‘slippery spaces’, from which resources and rents flow out of into ‘sticky places’, such as
cities with a diversified economic base and centralised economic power (Hayter et al.,
2003). Despite the multiple models and interpretations, it is important to note that some
scholars have found these various descriptions of the relationship between core and
peripheral places too simplistic (Fagan and Webber, 1999) and unable to explain the
structural and institutional agents that reinforce path-dependent development (Argent, 2013;
Martin and Sunley, 2006).

Arguably, the seminal work on resource dependence and regional development was
undertaken by Innis (1956) in the formation of ‘staples theory’ (Argent, 2013; Barnes et al.,
2001; Dow and Dow, 2003; Hayter and Barnes, 2001). Innis (1956) was the first to note the
separation of development into ‘core’ and ‘periphery’ through his analysis of the early
Canadian fur trade. Traders travelled into the peripheral areas to acquire furs, which were
then transported through a series of networks to be sold in the consumer markets of Europe.
These expeditions depended heavily on transnational finance and demand from Western
Europe, as well as developed networks of trading forts and routes to ensure the distribution
of goods. Within this system, differential performance could be found, dependent on
location, skills, and available tools or technology. This, in turn, affected local economic
development and multi-scalar integration. As they became integrated into a growing
number of trade networks, some trading posts began to develop into larger service centres,
rising up the regional hierarchy and acting as nodes or ‘core’ places for a range of
industries. Other posts remained peripheral and dependent on the trade of resource staples
and maintenance of production networks to survive. The social and economic wellbeing of
these places was directly linked to the strength of the industries supporting them, and the
limits to growth were set by the natural resources on which these places depended (Argent, 2013).

For many settler societies, building an economic foundation on these staple resources was a necessary step to allow for diversification and the development of secondary and tertiary industries (Walker, 2001). It also allowed resource economies to overcome the limits of growth that were shaped by geography (Bradbury, 1979). However, the progression of a resource-dependent or single industry economy to a diverse economy is not inevitable. Many communities have been unable to develop beyond resource dependence. Innis (1956) observed that some resource communities become locked into a ‘staples trap’ because of an over-reliance on a particular natural, or staple, resource (see also Hayter, 2000). Although this resource may have contributed to the initial economic growth, the economy fails to diversify because new investments tend to go into supporting the predominant industry. While there may be alternative industries present, much of the local economy will be heavily dependent on the multiplier effect from the export sector (Barnes et al., 2001; Fleming and Measham, 2014; Hayter and Barnes, 1990). This reflects the external orientation of the economy, as well as the dominance of macro-economic management and weak industrial structure (Barnes et al., 2001). The failure to diversify leaves the community vulnerable to changes in global commodity prices, variations of the business cycle, and the finite nature of the resource base (Barnes and Hayter, 1992; Hayter and Barnes, 2001; Wilson, 2004). While labour and capital flow into these economies quickly with favourable economic conditions, they also flow out easily when economic conditions change (Markusen, 1996).

Despite the early emergence of staples theory, contemporary literature examining how resource regions are adapting to an increasingly globalised economy remains limited (Argent, 2013; Barnes et al., 2001; Hayter, 2000; Hayter et al., 2003; Tonts et al., 2013). This is particularly true when looking within developed countries. Much of the research examining the changing interactions between places tends to focus on the manufacturing process (e.g. Amin, 2000; Krugman, 1991) and diffusion of technology (e.g. Castells, 2011; Keller, 2000; Warf, 2000), or explores the role of extractive industries in the economic development of developing nations (e.g. Bastida 2014; Edoho, 2011). While resource economies within developed countries are commonly overlooked, there is an increasing level of interest in understanding their dynamics (McDonald et al., 2012; Peck, 2013; Plummer and Tonts, 2013; Sheppard, 2013). Argent (2013, p. 332) points out that the
peripheral location of these resource-dependent economies might contribute to them being "out of sight, out of mind" and not receiving adequate academic focus. Hayter et al. (2003) likewise state that in addition to these towns being on the periphery geographically, they remain peripheral in academia. The structure of these places may seem more permanent, given the level of spatially fixed capital, or more simple, as resource extraction involves fewer processes than the production of manufactured goods, and therefore may not seem to merit as much in-depth study (Bradbury, 1979). However, resource towns have distinctive characteristics and a unique history of integration into the global economy that demonstrates a need for greater understanding of these places.

The study of resource economies is important to understand the nature of uneven development and the impact this has on individual people and communities. Globalisation has played out differently in resource peripheries compared to core locations. While centralised places arguably drive globalisation, the study of resource areas can provide insights into the actual outcomes and impacts that it has at the local scale (Hayter et al., 2003). The extra-local linkages that this economic integration creates can overwhelm a community’s capacity to retain control over their economy (Gramling and Freudenburg, 1990). Even within developed countries, resource-dependent economies are open and vulnerable. Although a considerable amount of wealth is generated in regional areas, the accumulation of wealth and power occurs in central localities. This perpetuates a geography of uneven development (Hayter et al., 2003; Tonts et al., 2013). It also contributes to increasing instability and economic dependence in these regional areas. A comprehensive look at these impacts requires the incorporation of multiple approaches, including assessments of the local economy, culture, politics and environment (Barnes, 2001; Lee and Wills, 1997; Thrift and Olds, 1996). The unique composition of each of these facets contributes to diversity amongst resource peripheries and their experiences with the global economy (Gibson, 2000; Hajkowicz et al., 2011).

The impacts of resource dependency on peripheral communities began to gain increasing attention in the 1970s, as the global oil shock led to rapid growth in many energy towns in rural parts of the western United States. Many of these studies focused on how the rapid growth due to extractive industries impacted the economies and social dynamics of rural and remote communities. An extensive study by Gilmore and Duff (1975) brought attention to a range of issues and led to a proliferation of research, focusing on a diverse range of problems, such as social upheaval of residents (see also Little, 1977; Smith et al., 2001),
shortage of infrastructure and services (see also Bender and Stinson, 1984; Semple and Ironside, 1992; Weber and Howell, 1982), increased cost of living (see also Brown et al., 1989; England and Albrecht, 1984; Ryser and Halseth, 2011), and a growing prevalence of social dislocation (see also Goldenberg et al., 2010; Kohrs, 1974). Other studies considered the temporal dimensions of change, such as Lucas’ (1971) seminal study that pointed to the ‘life cycle’ of resource towns as they transition from this highly unstable initial period to one of greater stability and a more normalised existence. Bradbury and St. Martin (1983) expanded on this work to incorporate a period of ‘winding down’, which may be followed by closure of the town or renewal of operations (see also Halseth, 1999a; Hayter 2000). Studies also examined the social and economic response of communities to these changes. Gilmore (1976), for example, identified the stages of enthusiasm, followed by uncertainty, panic and, finally, problem-solving in communities as they navigated through the changing local social and economic conditions. Other studies have found that while these initial impacts and responses are not atypical in resource communities, they are not permanent. Rather, it has been suggested that communities often settle into a new, normalised existence over time as various problems are addressed (Ryser et al., 2014; Smith et al., 2001).

Throughout the 1970s, as some resource communities were experiencing rapid growth, others were facing economic decline and closure. Expanding production and trade networks increased the vulnerability of resource communities, opening up their economies to greater international competition and leading to the closure of some communities that were unable to operate economically. Studies on economic downturn in mining towns have found that they often experience business closure, rapid out-migration, a decrease in services, and general economic constriction (Bradbury and St. Martin, 1983; Halseth, 2005).

Despite the long history of mining in Australia, and the expansive body of work in North America, relatively few studies had considered the social and economic issues associated with resource-led development prior to the early 2000s. Until recently, most Australian research on mining communities focused on social structure or issues of class and labour relations (e.g. Ellem, 1998; Gibson, 1991; Oxley, 1978; Walker, 1945; Williams, 1981). Only a handful of studies considered the social and economic impacts associated with resource development (e.g. Epps, 1993; Maude and Hugo, 1992; Parker, 1986). With the rapid expansion of the mining industry in Australia in the beginning of the twenty-first century, research into the impacts it has on communities has increase. The growing body of literature covers the effects of growth on housing (Ennis et al., 2013; Haslam-McKenzie et
al., 2009), migration (Argent et al., 2014), governance (Chesire et al., 2011; Everingham et al., 2013), social dislocation (Carrington and Pereira, 2006; Hajkowicz et al., 2011; Lockie et al., 2009), and local economic structure (Kotey and Rolfe, 2014; Petrova and Marinova, 2013). It has also examined the volatility of mining towns (Goodman and Worth, 2008), differential levels of impact between communities (Fleming and Measham, 2015; Sheppard, 2013) and the impacts of mine closure (McDonald et al., 2012; Pini et al., 2010). Another topic of research that is gaining attention in Australian literature is the range of impacts that a fly-in/fly-out (FIFO) labour force arrangement has on both the source community (Haslam-McKenzie and Hoath, 2014), host community (Cameron et al., 2014; Perry and Rowe, 2015) and places in between (Storey, 2001). Each of these topics are reviewed in more detail in the relevant chapters of this thesis.

1.4 Resource Extraction in Western Australia

Resource extraction has been critical in shaping Western Australia’s contemporary economic and social landscape (Blainey, 1993; Brueckner et al., 2013; Goodman and Worth, 2008). This section provides a brief overview of the development and geography of the State’s resource industry. The State is characterised by its size and the remoteness of its communities. Western Australia comprises the western third of the continent of Australia, and yet almost 79 per cent of its present population of 2.57 million people are concentrated in the capital of Perth (ABS, 2015). Much of the rest of the State is sparsely settled and resource extraction is often the dominant source of economic activity or sits alongside agricultural enterprises in these regions (Argent, 2013; Measham and Fleming, 2013; Tonts and Jones, 1997). The spatially-fixed nature of mineral reserves has contributed to variability in the interaction between local and global economies and has led to a history characterised by geographically uneven levels of development and prosperity across the State (Fleming and Measham, 2015; Jeffrey, 1975; Tonts et al., 2012).

The importance of resource extraction can be traced to the 1880s when the discovery of gold in the northern parts of Western Australia triggered some small, occasional gold rushes (Battye, 1924). However, it was the discovery of gold near the town of Coolgardie in 1892 that brought major economic and demographic change, soon leading to the formation of the nearby towns of Kalgoorlie (in 1892) and Boulder (in 1896) (Figure 1.1) (Blainey, 1993). Population growth increased rapidly, as support services and enterprises were developed. Due to the rapid influx of inhabitants, cities were crowded and poorly planned. As an
example of the pace of growth, the town of Kalgoorlie grew to nearly 25,000 people by 1899, just seven years after being established (Blainey, 1993; Crowley, 1959). This rapid population growth overwhelmed the ability to provide adequate housing, infrastructure and services (Webb and Webb, 1993).

Despite the difficulty in coping with this rapid growth, the area, known as ‘the Golden Mile’, was one of the ten largest metropolitan areas in Australia by 1900 (Blainey, 1993; Snooks, 1981; Webb and Webb, 1993). In addition to rapid population and economic growth, it also integrated the region into global circuits of capital and introduced new layers of complexity to the economic structure at the local level. Prospectors realised early on that the reserves were best suited for deep-shaft mining (Blainey, 1993; Snooks, 1981). This required the financial and technical support of mining companies and swept the Golden Mile into the world of mining syndicates, conglomerates and multinational corporations (Blainey, 1993; Crowley, 1960). Increased availability of capital led to better equipment, more efficient processing methods, and operations of scale (Blainey, 1993). Additionally, railroad connectivity lowered the costs of supplies and exports, making the industry more economically viable (Blainey, 1993; Crowley, 1960). Before long, the scale and rapid rate at which mining had transformed the economy led to it becoming a cornerstone in the colony’s development strategy (Plate 1.2).

Although gold was responsible for much of the population and economic growth of Western Australia during the late nineteenth and early twentieth century, the mining of other resources elsewhere in the State was also important to its development. In 1848, copper and lead extraction had started in the areas around Northampton and Geraldton, most of which was exported through the ports at Geraldton and Port Gregory. By the 1880s, Geraldton was a thriving port city exporting copper, lead, grain, and wool (Battye, 1924; Crowley, 1960). Given the isolation of the colony, shipping was an incredibly important aspect of economic and communication networks. However, it also made Western Australia more vulnerable to broader economic conditions. This was apparent by 1891 when global prices for copper and lead had dropped, significantly impacting the industries; by the early twentieth century, lead mining in Western Australia had all but ceased (Crowley, 1960).

To facilitate the transportation of resources, the government invested heavily in developing railways throughout the 1880s and 1890s (Battye, 1924; Crowley, 1959). The first lines linked Northampton to the port at Geraldton. Further south, the railway linking Perth to
Figure 1.1: Map of the present Goldfields-Esperance Region (Regional Development Australia, 2015).
Fremantle and Albany was expanded inland to access the population and resources in the gold mining region (Crowley, 1959). This made the resource industries in the region more economically viable, as it lowered the cost and time needed to transport ore. Expansion of the railway system also contributed to economic growth in other ways. The town of Collie, in the southwest of the State, had been established to support local coal mining. The increased demand for coal to support the new railways led to rapid growth in the town’s economy and population during the first two decades of the twentieth century (Battye, 1924; Crowley, 1960).

Following this period of rapid change, many towns experienced a decade of recovery and relative stability as services and infrastructure were developed to support the settler population (Crowley, 1960). However, towns continued to be differentially affected by global conditions. By 1910, high production costs in the goldfields (particularly for labour) meant the long-term sustainability of the regional economy was uncertain (Blainey, 1993; Snooks, 1981). The situation worsened during World War I, due to a shortage of workers, increased cost of living, and inability to source supplies from overseas (Blainey, 1993; Webb and Webb, 1993). The economic and political environment was adversely affecting...
the region and many gold mines closed (Blainey, 1993). While this period was one of difficulty for the goldfields, the increased global demand for lead revived resource industries near Geraldton, with copper and lead operations re-opening in 1910 (Crowley, 1959). The rail system expanded to access some of the more distant settlements, leading to growth in the pastoral, agricultural, and timber industries. There was also a brief period of revival in the mining of copper, lead, and tin in the north followed by the exploitation of asbestos in the 1920s (Crowley, 1960).

On a State scale, increased transportation networks and global demand led to growth in other industries, notably agriculture, to offset the decreased income from gold (Snooks, 1981). However, on a more local scale, access to particular resources contributed to spatially variable levels of growth, as other places began to prosper while the goldfields were facing decline. The economic problems had social consequences, as much of the population moved elsewhere and the towns of the goldfields fell into disrepair (Blainey, 1993).

The 1920s were a period of rapid expansion of the agricultural industry, with the State Government placing considerable emphasis on developing alternatives to mining (Crowley, 1959; Snooks, 1981). This period saw further expansion of the road and rail networks, as many of these agricultural goods were transported to ports to be shipped overseas. This period also saw some growth of secondary industries. This helped to accommodate some of the excess labour that resulted from the decline in the goldfields, but caused a spatial shift in population, with workers moving from the regional mining areas to the metropolitan region (Crowley, 1959). While mining as a driver of growth temporarily faded into the background, its contribution to economic diversification proved important in the face of changing global economic conditions.

The onset of the Great Depression in 1929 brought variable impacts across the State, due to local integration into global networks. The drop in the price of primary products led to decreased agricultural exports and a decline in rail traffic, adversely affecting the coal producing areas of the southwest (Crowley, 1959). As a ‘counter-cyclical’ commodity gold, on the other hand, experienced a resurgence in price, international investment, and government support (Blainey, 1993; Peel and Twomey, 2011). This spatial unevenness of growth and development became further entrenched after the depression, as the State’s mineral base diversified. Following the depression, the range of resources found throughout
the State led to variable rates of economic recovery. Asbestos mining in the Hamersley Range was proving profitable and was accompanied by prospecting for a range of other minerals, while Collie suffered from considerable poverty, as the price of coal had fallen sharply and was slow to recover (Crowley, 1960).

Global economic conditions continued to affect local economies, as the start of the Second World War interrupted recovery from the depression. The utilisation of both human and physical resources to the war efforts again saw gold production drop and lead mines in the midwest reopen (Crowley, 1959; Snooks, 1981). Economic growth following the war occurred much more slowly than after WWI and the State Government once again became proactive in developing primary industries, including a range of minerals such as tin, silver, wolfram, manganese, antimony, tantalum, molybdenum, and tungsten (Crowley, 1960; Ghosh, 1981). This growth was assisted by improved transport technology developed during to the war and sustained economic growth abroad (Crowley, 1960; Horsley, 2013).

Global economic and political conditions brought prosperity to many of Western Australia’s regions throughout the 1950s and served as the antecedents of the State’s current economy. The increase in wool prices due to the Korean War led to the development of new grazing lands and the growth of related industries (Crowley, 1959; Ghosh, 1981). The State’s extractive industry sector was also expanding, as many resources prices had recovered from the war and the mineral base continued to grow and diversify (Crowley, 1960). Although the State was prospering, secondary industry growth remained relatively limited. That which did exist was predominantly situated in and around Perth, although government policy of encouraging decentralisation saw some industries located in regional areas and at minor coastal ports (Crowley, 1960; Webb and Webb, 1993). In an attempt to further industrialisation, the government supported the implementation of an oil refinery in Kwinana, 40 km south of Perth, in 1952 (Black, 1981; Crowley, 1960; Horsley, 2013). The facilities were built predominantly with foreign capital, while the State committed large amounts to both social and industrial infrastructure (Black, 1981; Horsley, 2013). This was followed by the construction of a steel rolling mill and other industrial projects in the area, all of which brought thriving suburbs and the concentration of population within these industrialised areas. The diversification and expansion of primary and secondary industries integrated the Western Australian economy into the global economic structure in new ways, as much of it depended on foreign demand, investment, technology and skills (Black, 1981; Ghosh, 1981).
The 1960s saw a significant spatial and sectoral shift in the epicentre of Western Australia’s economic activity. The presence of iron ore in Western Australia had long been known, but an embargo placed on exports in 1938 had limited the extent to which this resource could be exploited (Black, 1981). Further exploration revealed the magnitude of reserves, particularly in the Pilbara region, and companies placed pressure on the Commonwealth Government to lift export restrictions. Japan was entering a period of incredible growth, providing a lucrative and easily accessible destination for Western Australian iron exports (Lipscombe, 1979). The embargo was incrementally lifted throughout the early 1960s, once again incorporating the Western Australian economy into a network of global partnerships, finance and transport (Ghosh, 1981).

The economic and population growth that occurred as a result of opening of iron ore to international markets predominantly occurred in the Pilbara. The region experienced rapid population growth as people moved to the region to take advantage of new job opportunities (Ghosh, 1981). The immense capital required for extraction meant that iron ore projects in the Pilbara were established by large companies, often as joint ventures (Horsley, 2013). The involvement of these transnational companies saw the newly formed communities firmly rooted in the global economic structure. While previous development agreements between the State and resource companies had seen the State Government providing much of the social and industrial infrastructure, agreements of the 1960s gave this responsibility to the companies (Black, 1981; Horsley, 2013). Community development, therefore, occurred in a much more orderly fashion than the initial rushes to the goldfields, with most mining communities established as ‘company towns’, where the resource company provided local infrastructure and employee housing, and carried out community administration (Horsley, 2013; Thomas et al., 2006; Webb and Webb, 1993).

By the mid-1960s, while growth had precipitated some economic diversification, the local economy of the Pilbara remained predominantly dependent on iron ore exports (Plate 1.3) (Sheppard, 2013). A brief steel recession in Japan in 1969 caused the development of secondary industries and community infrastructure in the region to be put on hold, demonstrating the level of influence international economies had on Western Australian localities (Lipscombe, 1979). By the mid-1970s, the Australian economy had reached a period of stagflation, where the economic growth was low, while inflation rates were high (Black, 1981; Peel and Twomey, 2011). This affected trade networks and investment, contributing to a decline in company profits. To address this, the government began to
contribute to some of the infrastructure costs (Horsley, 2013) and this ultimately led to the process of ‘normalisation’ of Pilbara towns in the early 1980s, where the responsibility of company towns was transferred back to the government (Horsley, 2013; Thomas et al., 2006). Additionally, iron ore companies were unable to afford to develop local secondary industries. It became apparent that the government would continue to allow them to operate, despite companies not fulfilling all aspects of the development agreements (Lipscombe, 1979). This allowed the global companies to operate with a more ‘hands off’ approach to dealing with their impacts on the local communities.

Although the iron ore industry was experiencing inconsistent growth in the Pilbara, other mineral sectors were contributing to local economic growth elsewhere in the State. The discovery of nickel in the eastern goldfields brought renewed economic activity to the region over the 1960s and 1970s (Lipscombe, 1979; Webb and Webb, 1993). Following the end of the gold standard in 1971, gold again experienced a revival in the 1980s in response to the high inflation and new processing technologies of the 1970s (Blainey, 1993; Department of Treasury and Finance, 2004). This era also saw an increasing interest the search for petroleum, particularly after the Organization of Petroleum Exporting Countries (OPEC) instigated price reforms in 1973, triggering a rapid rise in price (Lipscombe, 1979). The late 1970s saw growth in liquefied natural gas (LNG) and conventional petroleum exploration and development. This fulfilled one of the major restrictions that had limited the growth of the State’s secondary industries- an economically viable energy source- and provided a market for the growing energy sector. The complementary needs of the two.
sectors meant that the viability of one was dependent on the other. The availability of energy had the potential to contribute to growth in bauxite mining and the corresponding alumina processing in the southwest (Black, 1981; Lipscombe, 1979). However, concerns over the environmental impacts of bauxite mining in the late 1970s threatened construction of new alumina refineries that, in turn, jeopardised the development of the State’s first LNG project (Lipscombe, 1979). As such, there was strong political and industrial support for the construction of the refinery, which went ahead in 1978. The prominence of government support in the issue demonstrated the government’s priority of economic development.

The favour that the government showed to resource and industry companies was one of the factors making Western Australia an attractive place in which to invest (Black, 1981; Lipscombe, 1979). The State welcomed foreign investment and offered some of the lowest royalties in the world. Additionally, the State’s long established history of resource extraction meant that established infrastructure offset many traditionally high start-up costs (Plate 1.4) (Lipscombe, 1979). As such, numerous multinational corporations began operations in Western Australia in the late 1970s, predominantly in petroleum exploration.

Plate 1.4: In 1989, many of small gold mines were consolidated to create the Fimiston Open Pit, also known as the ‘Kalgoorlie Super Pit’. Photo by Rachel Chapman, 2012.
The development of petroleum industries added another level of prosperity to the Pilbara region. A large, accessible, offshore reserve led to the establishment the North West Shelf LNG plant in 1981, as well as other smaller extraction sites along the coast (Department of Treasury and Finance, 2004). The construction and implementation of this project brought another surge in population to the isolated Pilbara region. Although companies were no longer building and administrating communities, development agreements still addressed community wellbeing (Horsley, 2013; Kemp and Owen, 2013; Solomon et al., 2008). This represented a shift from the drastic interventionist policies of the past that had attempted to ensure socio-spatial equity, decentralisation of industrial development, and the development of regional areas (Horsley, 2013; Peel and Twomey, 2011; Tonts and Jones, 1997). Instead, these agreements took a much more indirect approach, emphasising local concerns, such as greater consideration of community concerns, community and social benefits, and consultation with local government (Horsley, 2013).

While much of the LNG from the North West Gas Shelf was originally intended for domestic use, demand was lower than anticipated and the industry began exporting LNG to Japan in 1989 (Department of Treasury and Finance, 2004). By 1991, Japan had become Western Australia’s largest export destination (Sheppard, 2013). However, in that year the extended economic boom ended. While this could have potentially been devastating for the Pilbara region and Western Australia as a whole, the numerous global networks that the region was connected to prevented serious economic decline. Western Australia was already integrated into trade networks with Korea and China, which were undergoing industrial expansion. By taking greater advantage of these existing trade networks to meet Korea and China’s growing energy needs, Western Australia offset the negative economic effects of diminishing Japanese demand (Department of Treasury and Finance, 2004).

In the early 1990s, worldwide recession decreased demand, prices and investment in Western Australian resources (DMP, 1992). As the Australian economy began to recover around 1994, Western Australia’s pre-existing integration into global markets caused it to outperform the other Australian states. This growth was variable across different sectors and was highly dependent on the rate at which other countries were recovering; commodities that relied on export to poorly performing countries continued to struggle, while others, such as gold and petroleum, recovered quickly (DMP, 1994). By the late 1990s, Western Australia’s resource industries were again constricting due to low global prices and inconsistent economic conditions in overseas markets (DMP, 1999). In spite of
unfavourable conditions overall, new nickel projects were proposed, as were the expansions of alumina and base metal processing facilities, indicating that poor conditions were not equally affecting all industries (Webb and Webb, 1993).

Over this period, Western Australia’s economic ties had shifted, with an increasing portion of exports going to Japan, Korea, China and Singapore (Department of Treasury and Finance, 2004). Growth in these economies, particularly China, has shaped Western Australia’s economic performance in the beginning of the twenty-first century. Overall, the value of all major mineral resources remained fairly steady from 2000 to 2004 (Figure 1.2). Iron ore and petroleum were the largest sectors, but alumina and nickel both experienced increased volume output following the expansion of the Kwinana processing facilities in the late 1990s (DMP, 2002). Starting around 2004/2005, growing demand in China for iron ore, high global commodity prices, and an increase in natural gas production brought considerable growth in the value of the minerals and petroleum sector. In 2004, minerals and petroleum were valued at A$28.4 billion and represented approximately 80 per cent of the State’s total merchandise exports (DMP, 2005). By 2011, the industry had reached record high values of $107 billion and composed 92 per cent of the State’s merchandise exports (DMP, 2012b).

The strong growth in iron and petroleum affected other commodities over this booming period. Much of this is due to the influence that this economic growth had on the value of the Australian dollar. An example can be seen in the sales of alumina, which exhibited fairly stable levels in value, despite varying volumes of production (DMP, 2005, 2008, 2011). The value of nickel and gold production exhibited more variation, as volatile global prices fluctuated from year to year (DMP, 2005, 2008, 2011). As had been witnessed before in Western Australia’s economic history, gold production proved to be a valuable asset in the wake of economic recession. Following the global financial crisis in 2008, the prices for most commodities decreased. However, the global price for gold increased, thereby ensuring continued investment in the State’s resource industries (DMP, 2010). This contributed to a rapid recovery from the global financial crisis and record high values in the minerals and resources in 2010-2011.

Because of the expansive nature of the State and the isolation many of new and established mines, companies have been turning increasingly to the use of a fly-in/fly-out (FIFO) workforce to meet their labour force needs (Haslam-McKenzie, 2011; Storey, 2001). This is
where workers fly from a city or hub community where they reside to work in a remote site for an extended block of time. They then are flown back to their home community for their accumulated time off (such as a roster of ‘4-and-1’, where workers work and live in a remote site for four weeks and fly out for their one week off). While the economic and social impacts of this practice are debated (see Cameron et al., 2014; Commonwealth of Australia, 2013; Haslam-McKenzie and Hoath, 2014; Perry and Rowe, 2015; Storey, 2001), it demonstrates yet another way that the global economy is directly impacting local, resource-dependent communities.

Minerals and petroleum are clearly a significant component of both the State and National economies. While growth varied from year to year, it is evident that 2001 to 2011 represents a period of industrial expansion, as the annual growth rate was 14.7 per cent over this time, compared to 8.4 per cent of the preceding decade (DMP, 2002, 2012). The boom is even more pronounced if looking just at the period of 2004 to 2011, when growth averaged 20.9 per cent per year. Although Western Australia has seen economic booms in the past, this period was different from others. Resource booms have often been triggered in the past by the discovery of a new reserve or technological advances that allow for a dramatic increase in the volume of extracted material. The recent boom, on the other hand, has been driven by

Figure 1.2: The value of minerals by commodity remained relatively constant until the resource boom began in 2004 (DMP, 2014).
global forces, as high demand from Asia led to an increase in global prices (Garnaut, 2014; Measham et al., 2013). This illustrates the extent to which global processes are precipitating economic changes at the local scale.

Since 2011, the minerals and petroleum industry in Western Australia has begun to contract. As numerous projects have transitioned from construction to operational phases, the vast availability of jobs has begun to decline. This has been coupled with a decrease in the global prices for iron and oil, affecting the entire energy sector (Butterly and Mercer, 2015). As of early 2015, extractive industries were experiencing widespread layoffs and a number of production sites were ceasing operations (Hageman, 2015; Klinger, 2015).

### 1.5 Organisation of Thesis

This thesis is composed of eight chapters. Chapter One identifies the aims and objectives of the thesis, gives an overview of the overarching themes of the thesis, and identifies the context in which the research was carried out. Chapter Two outlines the methods used to undertake the research reported on in this thesis. Chapters 3 to 7 are the papers that form the basis for this thesis. These published papers are as follows:


**Chapter 6:** Chapman, R., M, Tonts, and P., Plummer. 2015 Drivers of Growth in a Spatially Unequal Landscape. (For submission to *Growth and Change*)

The final chapter synthesises the key findings of this research, including its theoretical, empirical and methodological contributions. The thesis also concludes by discussing some of the implications for policy, and avenues for further research.
Chapter 2: Research Methods

2.1 Introduction

This chapter explains the research approach and methods used in this thesis. In examining the implications of resource-led development, the research drew on a range of qualitative and quantitative methods. These were broadly consistent with those used in other studies of rural social and economic change, though include some novel elements that were designed to suite the particular aims and objectives of this research. The approach and methods are explained and justified in detail in each of the individual papers, and therefore the purpose of this chapter is to provide an overview and justification for the research design, the selection of case study areas, the data collection methods, and the data analysis techniques.

2.2 Research Design

In order to meet the objectives outlined in Section 1.2, it was decided that a mixed methods approach was needed to account for the diverse ways in which global processes affect local resource communities. While interested in multi-scalar processes, the research was primarily focused on how local communities were adapting to and coping with the Western Australian resource boom of the early twenty-first century. As such, the research made extensive use of local level case studies, drawing on quantitative and qualitative techniques from a range of social sciences. Mixed methods approaches have been widely adopted in research on rural economic, social and political phenomena (e.g. Davis and Baulch, 2011; Hayati et al., 2006; Mertens, 2003), and provide a means of ensuring: insights are comprehensive, with strengths of some approaches outweighing limitations of others; the ability to provide insights across space and time in geographical research; the capability to triangulate findings or conclusions, thereby increasing the overall reliability of the study.

Figure 2.1 provides an overview of the research design, including the data collection methods, analytical techniques and chapters in which each technique was utilised. In broad terms, four main data collection methods were used: content analysis; interviews; Q-sort; and quantitative data. Content analysis involves gathering information from sources such as
newspapers or policy documentation. Interviews give insight into personal views on a specific issue. Q-sort is a type of survey technique that involves ranking how much one agrees or disagrees with an issue. Quantitative data consisted of selected measurable variables, including various census, economic, and industry data.

These data were analysed using a range of techniques, including: description; qualitative analysis; and various statistical tests. Both qualitative and quantitative data were used to describe select characteristics of the topics being studied. Qualitative analysis involved categorisation and thematic sorting of interview material, policy documents and observational data. The Q-sort data were analysed using Principal Component Analysis (PCA), which identified patterns across a series of structured interview responses to reveal commonalities amongst participants. The convergence testing used here revealed whether selected characteristics, such as economic inequality, increased or decreased over time and space. Linear regression provided insights into the role that a specific characteristic or variable plays in driving change in a feature being examined, all else being equal. Shift-share analysis analysed the components of economic growth, separating local components of growth from wider competitive processes.

Figure 2.1: The research design, outlining the data collection methods and analysis techniques used in each chapter.
2.3 Selection of Case Study Areas

This section provides an overview and justification for the case study areas that were selected for this research. It begins by providing a rationale for the wider regional setting of the study, before focusing on the selection strategy that was used at the local level. At this level, four forms of geographic area were used: a single town case study; a two town comparative study; a cross-sectional analysis across multiple towns; and a three town collective case study.

2.3.1 Regional Setting

Western Australia was the chosen setting for this study because of the rapid increase in resource-driven economic growth from 2004 to 2012 and the relatively high number of resource-dependent communities present. Indeed, no other state in Australia has larger export earnings or employment associated with resource-led development (DMP, 2012b). The 2004 - 2012 period also represents one of the most expansion periods of resource-led growth in the State’s history. While aspects of Commonwealth Government policy are relevant to resource-led industries and regional development, in reality much of this responsibility rests with state governments. Accordingly, undertaking the study in a single State meant that understanding the role of policy was more straightforward than in a multi-jurisdictional study. This was also an advantage in terms of data availability on resource production, much of which is collected by State Government agencies.

2.3.2 Single Town Case Study

At the finest scale of analysis, the research drew on a single town case study. This provided the researcher with the opportunity to undertake the initial fieldwork for this thesis, and offered a manageable scale to get a sense of economic, social and policy issues ‘on the ground’. The town of Onslow was selected for this initial analysis (Figure 2.2), largely because it was experiencing considerable change as a result of a proposed large scale gas processing facility for offshore reserves. A review of media reports, policy documents and other literature (Haslam-McKenzie 2013; Martin; Western Australian Planning Commission, 2011) indicated that the scale of the proposed development was causing local concern, but at the same time was also regarded as a significant opportunity. Onslow therefore had the potential to offer insights into a range of views held by multiple stakeholders. It also provided the rare opportunity to study a community as the change was occurring, rather than asking participants to recall their experiences after the fact. In order
to gain insights into the transitional challenges created by the introduction of major resource
development to a small community, the targeted stakeholders were local decision-makers,
business owners, and long-term residents. This target was set because it was assumed that
they would have good local knowledge and a strong interest in the long-term wellbeing of
the community. The Onslow case study forms the basis of Chapter 3: Resource
Development, Local Adjustment and Regional Policy.

2.3.3 Two Town Comparative Case Study

Building on the findings of the Onslow case study, the next step was to determine the extent
to which the general findings were unique to that particular community or experienced in
other rapidly growing resource towns. The decision was therefore made to compare Onslow
with the nearby but much larger town of Karratha (Figure 2.2). While originally established
to service the iron ore industry in the late 1960s, Karratha experienced rapid growth in the
1980s as a result of the discovery and development of the North West Shelf offshore gas
reserves (Horsley, 2013; Wilkinson, 1983). Like Onslow, Karratha has recently experienced
considerable expansion as a result of new gas processing ventures. However, the city has a
longer history of processing, is considerably larger (16 475 people compared to 1103
people, based on place of enumeration) (ABS, 2012), and has been the subject of a range of
regional policy interventions over recent years aimed at enhancing ‘liveability’ (AEC
Group, 2012; Pilbara Development Commission, 2014). In selecting these quite different
contexts, it was anticipated that a range of similarities and contrasts in the experiences of
resource development might be evident. This comparative case study forms the basis of

2.3.4 Cross Sectional Analysis

Building on the analysis of Karratha and Onslow, the next phase in the research was to
assess how the resource boom of the early twenty-first century affected small mining towns
in different ways depending on a combination of local level and broader scale factors. This
built on the earlier study of Tonts et al. (2012), who assessed the spatially uneven
socioeconomic performance of 33 small mining towns across Western Australia. This study
looked at performance at a single point in time, and concluded that more attention needed to
be given to temporal dynamics, thereby capturing the effects of the ‘resource cycle’. The
opportunity to address this gap was taken up in this thesis using the same cross-section of
towns, but adding a temporal component. The original criteria for selection in the Tonts et
al. (2012) study was that the towns had a population of less than 5,500 and were highly dependent on resource industries. This was defined as having a location quotient in mining employment of greater than 2.5. The 33 towns included in the analysis were highly diverse in terms of commodities, location, demography and length of settlement (Figure 2.3). In this thesis, the analysis of these towns extended the earlier study’s focus on socioeconomic

Figure 2.2: Map showing Onslow, Karratha, Albany, Geraldton and Northam, which were used for the single town, comparative, and collective case studies (Murphy, 2015).
performance, and added a new dimension that considered the extent to which variability in performance might be explained by local competitiveness. Cross-sectional analysis therefore forms the basis of two chapters: Chapter 5: The Resource Boom and Socioeconomic Wellbeing and Chapter 6: Drivers of Growth in a Spatially Unequal Landscape.

Figure 2.3: Map of the 33 study communities that were used in the cross-sectional analyses, differentiated by their predominant commodity (Murphy, 2014).
2.3.5 Three Town Collective Case Study

The final case study localities were quite different from those described above. Rather than focus on mining towns per se, the objective was to examine how mining might be affecting other rural (non-mining) localities ‘at a distance’. In this part of the research, the towns composed a ‘collective case study’, with the goal of identifying shared impacts across three communities: Albany, Geraldton and Northam (Figure 2.2). All of these towns are also part of one of the numerous strategic plans to facilitate the development of Western Australia’s regional areas (Department of Regional Development, 2015; Western Australian Regional Capitals Alliance, 2015). These communities were selected as they have economies that are not dependent on mining, and do not have extraction activities occurring locally, yet economic data demonstrate that mining is becoming an increasingly large source of employment for local residents (from 449 people across all three towns in 2001 to 1272 people across all three towns in 2011) (ABS, 2002, 2012). This is assumed to be due to an increasing fly-in/fly-out (FIFO) workforce, as all of these locations have, or are located near, an airport from which charter flights to mine sites depart. The case study examination was collective, rather than comparative, to get a view of the more general impacts on ‘non-mining towns’, which were found to be more similar between different locations than the impacts on resource-dependent communities. This collective case study contributed to Chapter 7: Reshaping Rural Communities ‘At a Distance’.

2.4 Data Collection

As described earlier, a variety of qualitative and quantitative data collection techniques were used to fulfil the research objectives. These methods included content analysis, semi-structured interviews, Q-sort, and quantitative data collection. The data were employed in multiple types of analyses and served to corroborate data collected from other sources. This section provides an overview of these data collection methods, including the approach to the content analysis, how participants were recruited for interviews and Qsorts, interview and Q-sort technique, and the sources of secondary statistical data.

2.4.1 Recruitment of Participants

Some of the data collection techniques required the participation of individuals residing in the case study communities. In recruiting participants, the overarching goal was to solicit the views of decision-makers and residents who had insights into the particular economic,
social and political issues in question. As such, the target population for participants included business owners, company representatives, policy-makers, and long-term residents. Initial contact was made by contacting the following: business owners listed in the Chamber of Commerce and Industry Directory; local government officials; local offices of various State Government departments; local offices of quasi-government and non-government bodies; mining companies operating in the area; and through existing personal networks. After conducting meetings, participants were asked to recommend other individuals who might be knowledgeable with regards to the issues under investigation.

At the outset of each meeting, participants were informed of the objectives, methods, and expected outputs of the research. Participants had the right to withdraw from the activity at any point, or to withdraw their response once the data collection was completed. All participants gave their written consent that their responses could be used in the research project, with the understanding that their identity would be protected. After giving signed consent (appendix A), participants completed a form with general demographic and other information (Appendix B). This process occurred in all data collection involving participants.

2.4.2 Content Analysis

Content analysis was used to gain an awareness of the range of issues associated with resource extraction, particularly in the context of rapid expansion, and to inform the overall direction of the research. Data were collected from a range of online and other sources, including: newspapers articles in regions affected by development; letters to the editor on development related issues or areas of need in resource communities; comments on online articles; literature by interest groups regarding areas facing potential development; government policies relating to resource development and reinvestment; and project reports. A sample of key documents is listed in Table 2.1. The data were used to construct questions and topics to be explored in the semi-structured interviews (see Section 2.4.3). It also served as a key component in the construction of the Q-sort materials (see Section 2.4.4) and guided the empirical data to be collected (see Section 2.4.5). The information gathered in the content analysis represents all scales of analysis, from individual views to state-wide and national policy and inquiries.
Table 2.1: Sample of key documents for content analysis.

<table>
<thead>
<tr>
<th>Document Type</th>
<th>Key Sources</th>
<th>Issuing Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Report</td>
<td><strong>Cancer of the Bush or Salvation for Our Cities?: Fly-in, fly-out and drive-in, drive-out workforce practices in Regional Australia.</strong></td>
<td>Commonwealth of Australia</td>
</tr>
<tr>
<td></td>
<td><strong>Karratha, City of the North Plan</strong></td>
<td>Pilbara Development Council</td>
</tr>
<tr>
<td></td>
<td><strong>Onslow: Regional HotSpots Land Supply Update</strong></td>
<td>Western Australia Department of Planning</td>
</tr>
<tr>
<td></td>
<td><strong>Onslow Townsite Strategy-Background Report</strong></td>
<td>Shire of Ashburton</td>
</tr>
<tr>
<td></td>
<td><strong>Onslow Expansion Plan: Building Blocks for a Vibrant, Sustainable and Prosperous Future</strong></td>
<td>Pilbara Cities Office</td>
</tr>
<tr>
<td></td>
<td><strong>Royalties for Regions Overview</strong></td>
<td>Department of Regional Development</td>
</tr>
<tr>
<td></td>
<td><strong>Western Australian Mineral and Petroleum Statistics Digest</strong></td>
<td>Department of Mines and Petroleum</td>
</tr>
<tr>
<td>Industry Documents</td>
<td><strong>Gorgon Project Overview</strong></td>
<td>Chevron</td>
</tr>
<tr>
<td></td>
<td><strong>Pluto Project Overview</strong></td>
<td>Woodside</td>
</tr>
<tr>
<td></td>
<td><strong>Wheatstone Project Overview</strong></td>
<td>Chevron</td>
</tr>
<tr>
<td>Interest Group</td>
<td><strong>Creating Communities</strong></td>
<td>Creating Communities</td>
</tr>
<tr>
<td>Literature</td>
<td><strong>FIFO Families</strong></td>
<td>FIFO Families</td>
</tr>
<tr>
<td>News Sources</td>
<td><strong>Save the Kimberley Campaign</strong></td>
<td>Save the Kimberley</td>
</tr>
<tr>
<td></td>
<td>ABC News Online</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Australian</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Goldfields Express</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Northwest Telegraph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pilbara Echo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sydney Morning Herald</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The West Australian</td>
<td></td>
</tr>
</tbody>
</table>

2.4.3 Semi-structured Interviews

A total of 92 semi-structured interviews were conducted as part of this research. However, it should be noted that some of these (n = 2) were undertaken solely as interviews, others were conducted in conjunction with the Q-sort process (n = 90), while some Qsorts were completed without a corresponding interview (n = 16). The total number of participants for key stakeholder categories are listed in Table 2.2, differentiating between short-term (less than five years) and long-term (more than five years) residents.
Table 2.2: Number of participants from each case study community, categorised by targeted stakeholder group and length of residence (short-term is less than 5 years, long-term is more than 5 years).

<table>
<thead>
<tr>
<th></th>
<th>Business owner/manager</th>
<th>Government</th>
<th>Non-government Agency</th>
<th>Mining Industry Rep</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Karratha (n = 24)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Long-term</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td><strong>Onslow (n = 29)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>9</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Long-term</td>
<td>8</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td><strong>Albany (n = 15)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Long-term</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td><strong>Geraldton (n = 18)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Long-term</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>Northam (n = 6)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Long-term</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

The interviews that were not associated with the Q-sort process were focused on issues covering; advantages and disadvantages of living in the community; perceived changes in the economy; satisfaction with available services; and opportunity for involvement in decision-making process. Interviews were conducted face-to-face where possible and typically lasted 50 minutes. If a suitable time to meet could not be found, participants were encouraged to provide written input (Table 2.3). The general approach to interviews was to have a broad set of themes that would be discussed with the interviewee, rather than a prescribed set of questions, although a general set of questions was used to illicit conversation and to ensure all topics were addressed (Appendix C). This provided scope to be flexible but consistent in terms of the themes covered, and also enabled the researcher to explore topics of interest as they came into the conversation. Extensive note taking, including the transcription of some direct quotes, was used to document responses.

Table 2.3: Semi-structured interview participation in the five case study communities (including interviews accompanying Q-sort).

<table>
<thead>
<tr>
<th></th>
<th>Onslow</th>
<th>Karratha</th>
<th>Albany</th>
<th>Geraldton</th>
<th>Northam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews</td>
<td>29</td>
<td>22</td>
<td>13</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Written contribution</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
Interviews were incorporated into the Q-sort process (see Section 2.4.4). The Q-sort materials served as the initial prompts for participants to elaborate on specific topics. A list of themes for discussion had also been prepared based on the information gathered during the content analysis. These were asked if a participant had insight into a specific topic, or had not addressed the topic based on the Q-sort prompts. These interviews typically ranged from 15 minutes to 75 minutes, with the majority lasting around 40 minutes. Again, responses were recorded using extensive note-taking.

2.4.4 Q-sort

Q-sort is a data collection technique that emerged within the field of psychology (Brown, 1980; Stephenson, 1935). It is described in detail in Chapters 4 and 7, though is essentially a combination of qualitative and quantitative techniques in one, that aims to systematically analyse subjective experiences and observations. Participants rank how much they agree or disagree with a number of potential impacts of resource development. Statistical analysis is then used to derive common perspectives shared by a number of participants. These common perspectives represent the predominant points of view within that community on the impacts of resource development.

This method was used for two separate components of the project. The first was in a comparative case study between Karratha and Onslow (Chapter 4). This focused on the perspectives of business owners, decision-makers, mining industry representatives, and long-term residents on how resource development was impacting each of the communities. Q-sort was also used in the collective study of Albany, Geraldton, and Northam (Chapter 7) to explore how the mining industry was impacting non-mining communities. This was based on input from business owners, decision-makers, and long-term residents.

The content analysis served as the starting point for the Q-sort data collection. Personal statements about the impacts of resource development were collected from a range of sources. These statements addressed general themes derived from community impact literature, which included: FIFO; community impacts; cost of living; equality of benefit; reinvestment; long-term impacts; and the environment. Multiple statements, often of opposing views, addressed specific issues within each theme. There were 43 statements in total and each was written individually on a card (Appendix D).
The Q-sort activity was conducted in individual meetings with participants. After a brief explanation of the aims of the study and of the methodology, participants were asked to rank the 43 statements based on how much they agreed or disagreed with them. They placed the statements in a structured template, ranging from 'Completely Disagree' to 'Neutral/Don't Know' to 'Completed Agree' (Figure 2.4). Each box in the template could only contain one statement and participants could re-allocate statements as much as they pleased until they were satisfied with the final rankings. Participants were encouraged to comment on the statements as they were completing the exercise. This feedback was recorded and used to assist interpretation.

![Figure 2.4: Template used for Q-sort data collection.](image)

In an attempt to gain more responses, a hard copy 'leave behind" version of the Q-sort was developed (Appendix E) for the Q-sort study in Karratha (n=3). An online version was developed for Albany (n=8), Geraldton (n=9), and Northam (n=6). These used the same statements as the Qsorts administered face-to-face and offered participants the opportunity to provide written feedback and comments.

There is no definitive consensus on the ideal number of participants for this method. However, this project attempted to align with Watts and Stenner’s (2005) recommendation of a 1:1 ratio of statements to participants, as it was the better supported of the two ratios found in the literature (the other being at least 2:1 suggested in Kline, 1994). For the comparative Q-sort, the final ratio of statements to participants was 43:48 and for the collective case study it was 43:46. These totals do not include the responses that had to be eliminated from analysis (n = 12) because participants felt unable to complete the exercise, chose to withdraw, or did not complete the exercise correctly. The format of responses and the total number of participants used in the analysis are summarised in Tables 2.4 and 2.5.
Table 2.4: Q-sort participation in Onslow and Karratha (n=48).

<table>
<thead>
<tr>
<th></th>
<th>Onslow</th>
<th>Karratha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face</td>
<td>29</td>
<td>19</td>
</tr>
<tr>
<td>Hard copy</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Eliminated</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total analysed</td>
<td>28</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 2.5: Q-sort participation in Albany, Geraldton and Northam (n=46).

<table>
<thead>
<tr>
<th></th>
<th>Albany</th>
<th>Geraldton</th>
<th>Northam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face</td>
<td>13</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Online</td>
<td>8</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Eliminated</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total analysed</td>
<td>17</td>
<td>21</td>
<td>8</td>
</tr>
</tbody>
</table>

2.4.5 Quantitative Data Collection


2.5 Data Analysis

Given the broad range of data collected as part of this research, a number of analysis techniques were used. These ranged from coding and sorting qualitative data into themes, descriptive analysis of quantitative data, and multivariate techniques for analysing the quantitative data. The following provides an account of the primary analytical techniques used.
Table 2.6: Data sources and quantitative variables.

<table>
<thead>
<tr>
<th>Source</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Census of Population and Housing (ABS)</td>
<td>population, population stability, Aboriginal population, mean income, levels of home ownership, levels of tertiary education, female participation in labour force, part-time participation in labour force, labour force participation, unemployment rate, employment in each industry at national level, employment in each industry at State level, employment in each industry at local level</td>
</tr>
<tr>
<td>Australia Taxation Office</td>
<td>percentage of population in receipt of Commonwealth benefits, average amount of welfare per recipient</td>
</tr>
<tr>
<td>Australian Department of Health and Ageing</td>
<td>remoteness</td>
</tr>
<tr>
<td>Western Australia Department of Regional Government (formerly Department of Local Government and Regional Development)</td>
<td>regional price index</td>
</tr>
<tr>
<td>Western Australian Electoral Commission</td>
<td>municipal voter turnout</td>
</tr>
<tr>
<td>Western Australia Department of Mines and Petroleum</td>
<td>value of production, employment levels, number of companies, commodities produced</td>
</tr>
<tr>
<td>Australian Department of Infrastructure, Transport, Regional Development and Local Government</td>
<td>general purpose funding</td>
</tr>
<tr>
<td>Real Estate Institute of Western Australia</td>
<td>cost of housing</td>
</tr>
<tr>
<td>Western Australia Department of Planning</td>
<td>Wheatstone Project employment projections</td>
</tr>
</tbody>
</table>

2.5.1 Qualitative Analysis

This project employs two forms of qualitative data analysis: content analysis and interviews. The content analysis proved an integral starting point, as it increased the researcher's knowledge on local issues, helped develop the research topic, and identified a number of themes to be investigated. A wide range of issues had been identified in the literature surrounding mining towns and this scope became more refined and relevant to the
local context through the content analysis. Analysis of newspapers articles, letters to the editor, and comments on online articles gave insight to the concerns of residents and the issues that were deemed the most significant. Industry and policy documentation gave some information on residents concerns and how these issues were being addressed. The themes commonly identified included: FIFO; community impacts; cost of living; equality of benefit; reinvestment; long-term impacts; and the environment. In addition to informing my own thinking and position, these themes guided the formation of interview questions and Q-sort statements, and provided some framework for the collection of quantitative variables.

The findings from the semi-structured interviews were organised according to the key themes identified through the content analysis. Additionally, themes were added if an issue commonly arose that had not been identified through the content analysis. The themes or issues that were added were often based on impacts that were very localised, but felt heavily by many people within the same community. Once the data were organised into themes, it was assessed based on the extent to which it was deemed a direct result of resource development and the policy issues surrounding it. Data from the interviews were often used to offer local context and to initiate the discussion of the prevalence of certain issues within the community. In many cases, interviews provided specific examples to either support or refute particular findings that have been discussed in mining town literature. It was also used to reinforce and to challenge quantitative data on specific topics, as well as inform the selection of quantitative variables to be included for analysis. The primary use of interviews in this research project was to cross-check or triangulate the findings of other types of analyses throughout the study. In Chapters 3 and 7, verbatim quotes from interviews are used to emphasise particular points and to further explore particular themes. These findings played a critical role in triangulating the results of other methods of analysis.

2.5.2 Q-sort Analysis

Q-methodology allows for the predominant views on a particular topic to be identified using a Principal Component Analysis (PCA). In essence, this multivariate technique helps the researchers to find common patterns across all responses. The qualitative content of the statements allows for subjective views to be conveyed, while the quantitative analysis allows for comparison between different communities. This helps address the objectives of this thesis by revealing how the history and characteristics of a place shape its identity and, in turn, influence residents' views on major resource development.
Once all participants have completed the Q-sort activity (Section 2.4.4), the PCA produces a number of components. Within each of these components, all the statements used in the Q-sort have a 'factor score.' Each component represents a perspective and each factor score show how that particular statement aligns with that view. A statement with a positive score means that statement "agrees" with that perspective, while a negative score "disagrees" with that perspective. In each component of this research project where Q-sort was used, the same set of statements was used across all study communities. The empirical approach to this analysis permits the responses from Onslow and Karratha to be analysed separately for the comparative case study. Similarly, the consistent use of the statements across communities allows the results from Albany, Geraldton and Northam to be amalgamated and analysed together for the collective case study.

2.5.3 Testing for Convergence

Convergence testing reveals whether measures are getting more similar or more dissimilar over a select time period. It tests whether places with low growth rates at the start of a given period have higher rates relative to all places in a subsequent time period. These cases are effectively 'catching up' to those that were initially performing better. On the other hand, if divergence is occurring, cases with low levels in the initial year experience lower growth rates than cases with high initial levels, causing them to lag even further behind. It was the initial stage of analysis in each component of this thesis that utilised statistical analysis because it gives the context of the environment in which subsequent analysis is occurring.

There are different methods through which convergence can be tested. The percentage of change relative to the initial year would indicate whether communities at lower levels were increasing at a faster rate. Another method is to graph the best fit line of growth along the y-axis, relative to levels in the initial year along the x-axis. If the slope of the line is negative, then convergence is occurring and the study communities are becoming more similar. In this thesis, this linear relationship is calculated statistically, using $\beta$-convergence testing. This is the most common method and is based on Solow's (1956) model, which provides a theoretical basis for the interpretation (Barro and Sala-i-Martin, 1992; Haupt and Meier, 2011). In this thesis, it was used to test different indicators of socioeconomic wellbeing and employment levels to determine whether these features were becoming more equal or more unequal over the mining boom. The model is defined in Chapter 5: The Resource Boom and Socio-Economic Wellbeing and Chapter 6: Drivers of Growth in a Spatially Unequal Landscape.
2.5.4 Shift-share Analysis

Shift-share is a relatively simple technique for analysing the structure and performance of local and regional economies (Dunn, 1960; Plummer et al., 2014; Stimson et al., 2006). In this thesis, it is used to measure employment growth (or decline) by industry sector. Shift-share decomposes growth (decline) into three components: national, industry, and local. The analysis allows the levels of growth (decline) occurring locally to be isolated from that which is explained by growth in the broader economy or by growth levels in select industries. This shows how local levels of growth vary between place and can open further opportunities for research, specifically in examining the reasons for this variable growth. The technique was used in this thesis as a means of understanding the competitiveness of local economies. That is, it was used to provide insight into the extent to which local growth (decline) can be accounted for by statewide levels of growth and the specific mix of industries in each place. The technique was used in Chapter 6: Drivers of Growth in a Spatially Unequal Landscape, where a more thorough overview is provided.

2.5.5 Linear Regression

Linear regression was used in this study to provide insights into the local and other factors that drive socioeconomic wellbeing and differential levels of employment growth. In this thesis, linear regression is used as a tool to determine the extent to which the performance of dependent variables can be explained by a suite of theoretically informed independent variables. The technique underpins Chapter 5: The Resource Boom and Socio-Economic Wellbeing and Chapter 6: Drivers of Growth in a Spatially Unequal Landscape. The modelling strategy and model specifications are described in these chapters.

2.6 Limitations of the Study

While every effort was made to ensure the research that underpins this thesis was as thorough and robust as possible, there were nevertheless a number of limitations to this study that need to be taken into account. These relate primarily to the pragmatics of fieldwork, participant recruitment, and data availability. Primary data collection took place in locations ranging from 100km from Perth (Northam) to 1500km from Perth (Karratha). Due to limited funds and the need to travel such distances, it was deemed most time- and cost-efficient to travel to the case study communities for a short period of time, with multiple interviews being conducted per day. With the exception of a one day trip to
Northam, fieldwork trips usually ranged in duration from five to seven days. For the most part, this proved effective, but there were some instances where the limited periods of data collection resulted in some potential recruits being unable to participate. To overcome this obstacle and recruit a greater number of participants, face-to-face interviews and Q-sort exercises were supplemented with a hard copy of the exercise in Karratha and an online version in Albany, Geraldton and Northam.

Recruiting a sufficient number of participants within the desired stakeholders presented another challenge on the study. The desired groups included business owners and managers (including mining industry representatives), local decision-makers, and long-term residents. The objective was, wherever feasible, to examine the perspectives of people who were resident in the study communities. Many of the business owners who were contacted lived in Perth, and the level of decision-makers that lived locally was limited by whether or not that community served as an administrative centre for the surrounding region. This also posed a challenge in contacting representatives from the mining companies. Participants were encouraged to give their personal opinion, rather than that of the company or office with which they were affiliated. However, the mining industry is underrepresented as most recruitment attempts were directed to a community liaison officer and it proved difficult to contact further representatives of the industry. In hindsight, these challenges could have been dealt with by relaxing the requirements of participation to include those who work, but do not live, in the case study communities.

A third limitation of this research relates to the availability of statistical data. The majority of data come from government releases and are not always available or measured consistently from year to year. This placed some restrictions on the variables that could be included, as consistency is necessary to ensure accuracy across time periods. The use of data to measure abstract and undefined concepts, such as 'wellbeing', also proved challenging, as there is no single statistic that fully captures these concepts. Rather, proxy variables that measured a specific aspect of the concept in question were used, often drawing on multiple variables to measure the same concept. These variables do not always capture every aspect of the concept that is being examined and can, therefore, lead to some ambiguity in the findings.
2.7 Conclusion

The approach and range of techniques that were utilised in this research were selected to capture the complex array and uneven distribution of impacts of global economic processes on the individual and community scale. Western Australia was the chosen setting for this research, as the State experienced rapid economic growth at the beginning of the twenty-first century, driven largely by global economic conditions. The extent to which this impacted the economic and social conditions in small, resource-dependent communities varied both spatially and temporally. This research aimed to investigate how these impacts differed across the State and over time.

The research techniques that were employed covered a spectrum in terms of the extent to which they are considered qualitative or quantitative methods. This mixed methods approach was used to gather information ranging from personal insights to statewide measurements. It also revealed the extent to which the effects experienced by individuals are reflected in broader empirical data and vice versa. Using different methods allows for more robust research. The strengths of one technique can compensate for weaknesses in another and the multiple forms of analysis can be used to triangulate findings. The various types of analyses were organised around themes that were derived from the literature, as well as those that arose during data collection. These themes were FIFO; community impacts; cost of living; equality of benefit; reinvestment; long-term impacts; and the environment.

To gain insight into the most predominant issues being experienced in communities, a content analysis was used. This both increased the researcher's own knowledge and informed subsequent data collection and analysis. Data from the literature and the content analysis were used to compose semi-structured interview questions. This qualitative technique gives in-depth insight into the personal and subjective experiences of those being impacted by resource development. Q-methodology was used to provide some empirical support for subjective experiences. It allowed for analysis on a broader scale, using individual experiences to distil the most predominant perspectives within the community.

Empirical data were used to measure different aspects of theoretical constructs and non-empirical concepts surrounding socioeconomic wellbeing. Although there were some limitations to the extent to which these concepts could be quantified, the study provides a novel approach in synthesising both qualitative and quantitative data in this way. Finally,
accounting and statistical analysis techniques were used to the impacts of mining and the spatial variability of these impacts. The use of quantitative data collected at regular intervals also allows for temporal analysis, examining how indicators have changed over the period of the resource boom.

The range of quantitative and qualitative techniques allowed for analysis of various impacts at different spatial scales. Chapters 3 through 7 examine a range of spatial scales, with each chapter focusing on a specific aspect of the impacts of global economic processes on individuals and communities. As this is a thesis by publication, the factors under consideration and the specific techniques used to meet these objectives vary by chapter. Each chapter contains an explanation of its specific aims and the techniques used to achieve those objectives.
Chapter 3: Resource Development, Local Adjustment, and Regional Policy: Resolving the Problem of Rapid Growth in the Pilbara, Western Australia

3.1 Prologue

This chapter was published as a paper in the *Journal of Rural and Community Development* (2014, vol. 9, p. 72-86) and was the first major piece of field investigation undertaken as part of this thesis. It also represents my first opportunity to spend a substantial amount of time in a remote Australian resource town, having arrived from Canada to commence my PhD studies early in 2012. The research was conducted in Onslow in Western Australia during mid 2012, and was concerned with how one of Australia’s largest energy investments – the Wheatstone Liquefied Natural Gas project – was impacting the town. The fieldwork was carried out at an early stage in the project’s development, and therefore provided an opportunity to study a community while transformation was underway, rather than to examine the impacts retrospectively. Given the amount of existing Australian and international literature on the impacts of rapid resource-led development, I was particularly interested to see if the relevant government agencies and companies had learned from past experiences, both in Western Australia and elsewhere. The study found that despite considerable efforts being invested into ‘problem identification’, both wider policy and ‘on the ground’ responses had been minimal, thereby hindering local adjustment and adaptation. The paper concludes by reflecting on the reasons for this lag in response and the extent to which this might exacerbate the problems facing the local community.
3.2 Introduction

Resource industries are dramatically changing both the physical and cultural landscapes of Western Australia. The past decade has witnessed a rapid increase in investment in both minerals and petroleum industries, with the vast majority of new projects located in remote regions (Tonts et al., 2012). Indeed, investment in new projects is particularly strong, and at the end of 2012 more than A$100 billion had been committed to a range of resource ventures (DMP, 2012a). Of this, more than A$78.5 billion was invested in the oil and gas industry, virtually all of which was concentrated in remote areas. While many of these projects are operated as temporary camps on a fly-in/fly-out basis, a number are co-located with existing towns. The scale of major resource projects is leading to rapid economic, social, and political changes in these communities, and is contributing to significant challenges for regional planning and governance (Cheshire, 2010; Lawrie et al., 2011; Rolfe et al., 2007).

One of the major problems facing policy-makers is that once a project is approved, development often proceeds at a pace that exceeds the ability of governments to keep up with necessary service and infrastructure needs. There is a considerable body of evidence to suggest that this contributes to social dislocation and, at least in the short term, a decrease in the local standard of living (e.g. Haslam-McKenzie et al., 2009; Petkova et al., 2009). While large investments are made by resource companies in an attempt to minimise the negative impact of their presence within the community and to bolster their acceptance amongst local residents (e.g. Cheshire et al., 2011; Morrison et al., 2012), they do not necessarily mitigate against the problem of ‘policy lag’ in addressing service and infrastructure shortfalls.

This paper aims to contribute to contemporary debates about the impacts of rapid resource-led development on small remote towns through an examination of a major new gas development located near Onslow in the north west of Western Australia. More specifically, it seeks to better understand governmental responses to rapid development, and the extent to which the problem of ‘policy lag’ might exacerbate the transitional challenges experienced by small towns in the face of rapid resource development. This paper is based on 28 semi-structured interviews with long-term residents, local government officials and business owners in Onslow. Information gained from those interviews was then corroborated with a review of statistical data from various sources and a qualitative review of relevant policies. The next section of the paper provides a brief review of relevant literature, before offering
an overview of the local and regional context. It then turns to an analysis of selected impacts, before considering policy responses.

### 3.3 Rapid Resource Development and Policy Response

The impact of rapid resource-led growth on small towns has been the subject of extensive academic inquiry (e.g. Brown et al., 1989; Halseth, 1999a; Hajkowicz et al., 2011; Lawrie et al., 2011; Little, 1977; Wilson, 2004). One of the consistent themes in this body of work is the social, economic, and political upheaval experienced in the initial stages of a major new resource project. The pioneering studies on the impact of resource boomtowns were conducted in the United States in the 1970s, and drew attention to the social dislocation that was associated with rapid population growth, a highly mobile and male dominated workforce, and, in particular, the inability of services and infrastructure to cope with this population influx (e.g. Gilmore and Duff, 1975; Gilmore, 1976; Little, 1977; Weber and Howell, 1982). One of the most influential of these studies (Gilmore, 1976) was suggestive of a ‘stages of development’ model in which communities would transition between: (i) enthusiasm about the potential economic benefits of resource development (see also Freudenburg, 1992; Gulliford 1989); (ii) uncertainty of what the community’s needs will be and how to meet them; (iii) panic, as the enormity of the imminent changes become apparent; and (iv) problem-solving, as they gain a better understanding of the adaptations needed within the community (Gilmore, 1976). Thus, there was a sense that communities eventually adapt as a project progresses. Indeed, a number of longitudinal studies have found that many of the negative consequences of rapid growth become less evident or disappear over time (e.g. Smith et al., 2001).

While the problems associated with rapid resource-led development may well dissipate with time, there is nevertheless a period of significant transition that communities must negotiate in the early stages of a resource project’s ‘life cycle’ (Halseth, 1999a; Haslam-McKenzie et al., 2009; Tonts, 2010). Some of the most significant issues associated with the rapid immigration of a construction and mining workforce include the rising cost of housing and land; a sharp increase in the cost of living more generally; the inability of key services such as schools and hospitals to meet demand; poor levels of infrastructure support; income inequality between mining and non-mining residents; and rising levels of social and political conflict (Brown et al., 1989; England and Albrecht, 1984; Gilmore and Duff, 1975; Haslam-McKenzie et al., 2009; Rolf et al., 2007). The resulting degradation in quality of
life and community satisfaction can lead to difficulties in attracting and retaining workers, many of whom can earn comparable salaries in towns with higher levels of social and environmental amenity (Brown et al., 1989; Smith et al., 2001). This, in turn, has the potential to contribute to labour shortages, particularly in some of the lower paid non-mining service occupations, which further exacerbates service delivery problems and, therefore, quality of life (Gilmore and Duff, 1975; Little, 1977; Tonts, 2010; Wilson, 2004).

Much of the boomtown literature of the 1970s and 1980s emphasised crisis and social dislocation during the initial phases of major projects. The past decade has seen much of this work subjected to considerable critique, suggesting that many were alarmist accounts that overlooked the diversity of experiences across resources communities (Brown et al., 1989; Greider and Krannich, 1985; Smith et al., 2001; Wilkinson et al., 1982). Indeed, a growing number of studies have pointed to considerable heterogeneity amongst towns, arguing that a number of factors shape the patterns of development, including the pre-existing socioeconomic and demographic structures of towns, the political economy of the resource itself, the role and behaviour of companies, and regulatory and institutional structures (Nord and Luloff, 1993; Randall and Ironside, 1996; Reeson et al., 2012; Tonts et al., 2012). Thus, planning and policy responses to rapid resource-led growth need to be adapted to local context.

The literature on planning for resource communities has traditionally argued that the focus needs to be on a rapid transition from initial project design and construction to ‘maturity’ (Halseth, 1999a). The central objective was to ensure that towns not only had adequate service and infrastructure provision, but also housing diversity and availability, diversified economies, and a dynamic civil society (Gill, 1990, 1991; Veit, 1978). However, a key ingredient for success is the ability of planners and policy-makers to initiate responses ahead of the scaling up of construction and production. Yet, the evidence suggests that governments are often slow to react to new developments, with policy-making often following a quite different temporal rhythm to the commercial decision-making of mining companies. At its worst this policy lag has the potential to exacerbate the difficulties facing rapidly growing communities, or at the least slow the adjustment and adaptation process.
3.4 The Regional and Industry Context

The past decade has been one of extraordinary economic growth in Western Australia, almost exclusively on the back of minerals and energy resources. The State produced 56 per cent of Australia’s A$188 billion mining and petroleum outputs in 2010-2011 (DMP, 2012b). This represents a 49 per cent increase in value of the State’s mineral and petroleum industry in 2009-2010 and a further 39 per cent increase in 2010-2011, with iron ore and liquefied natural gas (LNG) as the two dominant commodities (DMP 2012b). Much of this growth has been driven by the exports from the Pilbara region in the north of Western Australia. While iron ore currently dominates the Pilbara economy, LNG is an increasingly significant component of the region’s economic output. Shipment of LNG from the Pilbara region began in 1989, and by 2011 the value of output had reached A$9.3 billion (DMP 2012b) (Figure 3.1).

![Figure 3.1: Value of Production of Petroleum Products and LNG in Western Australia, 1990/91-2010/11 (DMP, 2001, 2012b).](image)

The majority of LNG gas processing and handling is concentrated around the town of Karratha, which is the largest settlement in the region with a population of 16,500 (ABS, 2012). Recently, new projects have been under consideration that will see processing and handling occur in other parts of the region. One of the most notable of these is Chevron’s Wheatstone development. The project is one of Australia’s largest energy ventures, costing A$29 billion and processing 8.9 million tonnes of LNG per annum, with the capacity to
expand production to 25 million tonnes per annum (Chevron, 2012). The gas fields for this project are located some 220 kilometres offshore, and will be processed onshore, 12 kilometres north of the small town of Onslow (Figure 3.2). The construction workforce is estimated to be around 6,500, with the operational employment of about 400 (Chevron, 2012). In addition to Wheatstone, Onslow also hosts the smaller BHP-Billiton led Macedon gas project, which is valued at A$1.5 billion, and commenced production in September 2013.

The scale of new energy projects near Onslow is discordant with the town’s small population. At the 2011 census, the town’s population (based on place of enumeration data) was 1,103, which represents an increase of 308 people (38.7 per cent) on its 2001 population of 795 (see Table 1). Prior to 2001, the population had been largely stable, ranging between 594 in 1981 and peaking at 881 in 1991 (Shire of Ashburton, 2010). Over this period, the economy was dominated by salt mining, some fishing activities, and a modest oil and gas industry. More recent changes to the local economy are reflected in Table 1, with the total labour force increasing from 274 to 460 (ABS, 2012). The strongest growth was recorded in construction, reflecting some of the initial work on Wheatstone, and not surprisingly, mining. The data on retail trade, which remained steady, suggest that the significant benefits from new projects are yet to flow through all sectors of the local economy.

3.5 Projections of Change in Onslow

The Wheatstone gas field was discovered in 2004 and in 2008 Chevron announced its intention to develop the field and base an onshore processing plant near Onslow. The engineering and design feasibility studies commenced in 2009, with final environmental approvals for the project being granted in 2011. Initial construction activity commenced at the end of 2011. Thus, the period between Chevron signalling the intent to develop and the commencement of construction was around four years. Over this period, considerable work was done by both government agencies and Chevron on the likely demographic, social and economic implications of this project and what might constitute the necessary responses (e.g. Western Australian Planning Commission, 2011; Pilbara Cities, 2012).
Figure 3.2: Location of Onslow, Western Australia and some of the closest surrounding towns (Murphy, 2013).

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Absolute Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>795</td>
<td>1,103</td>
<td>308</td>
<td>38.7</td>
</tr>
<tr>
<td>Employment in Selected Industry Sectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>21</td>
<td>79</td>
<td>58</td>
<td>276.2</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>9</td>
<td>31</td>
<td>22</td>
<td>550.0</td>
</tr>
<tr>
<td>Construction</td>
<td>29</td>
<td>100</td>
<td>71</td>
<td>244.8</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>20</td>
<td>17</td>
<td>-3</td>
<td>-15.0</td>
</tr>
<tr>
<td>Other</td>
<td>195</td>
<td>233</td>
<td>38</td>
<td>26.2</td>
</tr>
<tr>
<td>Total</td>
<td>274</td>
<td>460</td>
<td>186</td>
<td>67.9</td>
</tr>
</tbody>
</table>

Some of the most telling indicators of change are in the demographic projections. Figure 3.3 shows that between 2011 and 2025, the population living in the town is expected to increase from 796 to around 3,800; a rise of more than 377 per cent (Western Australia Planning Commission, 2011). However, this only presents part of the picture. In addition to the population living in the town, worker accommodation camps nearby will accommodate those involved in the construction of the Wheatstone and other resource projects. The number of people housed here will vary between 300 and a peak of 6,500 in 2019, when the second phase of the LNG processing facility will be constructed. The camp is expected to be wound up by the end of 2021.

These data point to the complexity facing planners and policy-makers in dealing with rapid resource-led growth. They indicate the different phases of development, including construction, operation and expansion (e.g. Halseth, 1999a; Tonts, 2010), and the need for both a temporary, out of town workforce and a residential workforce based in Onslow itself. All of this is further complicated by the fly-In/fly-Out (FIFO) nature of some of the workforce. Once the gas processing facility becomes operational, it is estimated that the operational workforce will continue to use between 240 and 600 FIFO workers at any given time (Western Australian Planning Commission, 2011).

The rates of projected growth are consistent with those that Little (1977) argued represented a critical threshold in the United States energy boomtowns of the 1970s. Little found that
most communities were able to cope with annual population growth rates as high as five per cent while maintaining comparable levels of service provision, cost of living and social cohesion. Once annual population growth rates exceed about 10 per cent, the ability of the community to provide the same quality and quantity of infrastructure and services was often overwhelmed (Bender and Stinson, 1984; Gilmore, 1976; Little, 1977). Social cohesion and stability were also claimed to become problematic at around this point. Growth rates of more than about 15 per cent per annum were found to trigger institutional breakdown, often leading to services such as education and health care to fall well behind demand (Bender and Stinson 1984; Gilmore, 1976). Moreover, social dysfunction and political tension often became serious problems when annual growth rates were very high.

In anticipating some of these potential impacts, the Western Australian Planning Commission (2011) has considered how projected population change is likely to affect demand for land, housing, basic services (e.g. education, health care, social welfare, etc.), and infrastructure. While some attention has been given by the Planning Commission and other agencies to the implementation of strategies to mitigate impacts, in general efforts have been focused on ‘problem identification’. Thus, over the four years that the project has been in the planning and development phase, relatively little has happened ‘on the ground’

**Figure 3.3:** Population projections for Onslow, 2011-2025 (Western Australian Planning Commission, 2011).
to prepare the community for imminent change. This is despite the considerable lessons that can be learned from other boomtowns in Australia and elsewhere, and notwithstanding the extensive body of ‘impact studies’ that have been undertaken on Onslow by both the government and companies. Evidence is now emerging that Onslow is beginning to experience some of the symptoms typical of Gilmore’s second and third phases of boomtown development during which the community remains unprepared for rapid growth and is characterised by a sense of ‘loss of control’.

3.6 The Changing Face of Onslow

In the latter half of 2012, semi-structured interviews were carried out in Onslow with community members perceived to have a vested interest in the long-term wellbeing of the town. Specifically, this included local government officials, local business owners and long-term residents. Residents had mixed feelings about the development, with many recognising the potential benefits, but lamenting the loss of Onslow’s ‘small town feel’. Since construction of Wheatstone commenced, a chemist had begun operating in the community, signalling the potential for further improvements of local amenities. One local business owner summed up residents’ sentiments, saying, “Everyone wants a fancy new town, but they put the camp outside the town because they don’t want more people here.” From these interviews, it became apparent that there was a sense amongst local residents that the town was on the precipice of a major transformation over which they would have little control. As one participant stated, “It’s going to happen, so we should make it happen in the best possible way.” This issue, also identified by Gilmore (1976), is a consistent theme in boomtown research (Freudenburg and Wilson, 2002; Haslam-McKenzie et al., 2009; Wilson, 2004), and is now given increasing attention by planners, policy-makers and companies. For example, the establishment of the Onslow Community Reference Group in 2011, with membership including the local government, Chevron, BHP Billiton, some contracting firms, community members, and a number of State Government agencies was a deliberate effort to encourage sharing of information about the nature of development and community concerns. Moreover, the large companies have established quite extensive community consultation and development procedures that are aimed at ensuring residents do not feel disengaged and powerless.

For Cheshire et. al. (2011), this represents a complex shift in the governance of resource projects, with companies more actively engaging with governments and communities to
tackle social and economic issues, and to promote ‘buy in’ from local residents (see also Labonne, 1999). Importantly, Cheshire et al. (2011) also indicate that companies are often left to ‘fill the gaps’ as a result of government inaction, particularly in the areas of service and infrastructure provision. While this is often now wrapped up in a logic of ‘corporate social responsibility’, it nevertheless represents a particular view on how resource towns ought be both governed and serviced. In Onslow, for example, Chevron alone have committed nearly A$250 million towards local infrastructure, community facilities and services on the basis that this would be supplemented with funding from other sources (Department of State Development, 2012). Despite this committed investment, many of these projects have not progressed, largely as a result of governments’ inability to respond quickly to the emerging needs. Thus, despite the considerable efforts that have gone into problem identification and anticipation, community engagement, and the provision of company funding, there remains a view amongst residents that the community was “playing catch up” or “behind the eight ball”.

One of the central problems here appears to be the unwillingness of government agencies to commit to the upgrade or provision of new infrastructure and services until the company involved has full regulatory approval and financial surety. This is apparent even to local residents, with one business owner stating “[the government] knew the project was coming, but didn’t do anything until the final investment decision went through.” Thus, while large multinational companies or joint venture projects tend to proceed on the basis that “all will be well” and that regulatory and financial approvals are largely a formality, governments tend to adopt a more cautious approach. Much of this is associated with prudence regarding the use of public funds and, of course, political sensitivities. Moreover, there is a tendency to wait until there is ‘proven demand’ before investing. Thus, there tends to be a temporal mismatch between commercial and public sector decision-making and action. When a company does get final regulatory and financial approval, the development proceeds very rapidly, whereas government agencies operate on a slower timeframe. Local residents also perceived this lag to be due to “the government trying to get everything they can from the company before they’re willing to put their hands in their own pockets.” In the case of Onslow, the impacts of this are now being felt in a number of areas, two of which are considered in more detail here: (i) housing, and (ii) essential services and infrastructure.
3.6.1 Housing

Numerous Australian and other studies have pointed to the significant problems that confront housing markets in rapid growth resource communities (Haslam-McKenzie et al., 2009; Lawrie et al., 2011). The very rapid influx of new workers drives up demand for accommodation, leading to sharp increases in prices for both the rent and purchase of housing. Because the release of land and the construction time for housing is often slow, adjustments in housing markets tend to be rather protracted.

There is evidence that in Onslow the cost of housing has risen sharply since the Wheatstone project was announced. According to the Real Estate Institute of Western Australia (REIWA, 2012), in 2008 the median price of a house was just over A$300,000. By 2012, it had increased to A$830,000; a rise of more than 176 per cent. Indeed, the median cost of a house in Onslow exceeded that of the Perth metropolitan area (A$480,000). When compared to other major resource towns in the same region, in 2012 Onslow was more expensive than Karratha (A$797,000) and Port Hedland (A$825,000), both of which provide more extensive infrastructure and services. The median cost of rental accommodation has also increased rapidly, rising from A$450 per week in 2010 to A$2,500 per week in 2012 (REIWA, 2012). The quality of housing in Onslow is also problematic. In a recent study conducted by the local government, it was noted that housing is generally old and in poor condition. The average age of a house is 39 years, with very little new housing construction in the town between 1993 and 2010 (Shire of Ashburton, 2010).

The combination of the availability, cost, and quality of housing is forcing people to use alternative accommodation options. During interviews it was suggested that as a result of rising housing costs the local caravan park is not only home to a growing number of new workers, but also long-term residents. In some cases, these appear to be people ‘displaced’ from the traditional housing market as a result of cost. One participant stated that they were “choosing to live in the caravan park, and not contribute to the over-priced rents in town.” However, even in the caravan park costs are high, with weekly rates for long-term residents at $400 per site, plus an additional $35 for electricity. While this is lower than rental costs, it is still higher than other caravan parks in the north west of the State. A survey of other caravan parks throughout the Kimberley and Pilbara found rates for long-term residents ranging from $130 per week in Kununurra to $273 per week in Broome.
A number of interviewees indicated that the cost of both the caravan park and more traditional housing markets were too expensive for some workers. This has created difficulties for some business owners in the non-resource sectors where wages are typically low and constrained by the nature of the enterprise. A number of innovative responses were reported as a means of retaining employees, including setting up caravans in back yards to accommodate workers and thereby avoid paying the high wages necessary to cover the cost of housing. In another case, three large tourist boats from the Great Barrier Reef are moored at the town with beds for some 100 or so workers.

While the spike in housing costs is essentially the result of supply and demand issues, residents repeatedly pointed to the role of government inaction in leading to the local housing ‘bubble’. Most pointed to the role of the State Government’s land development agency Landcorp, which is responsible for the subdivision and release of publicly owned land. The general sentiment was that the Landcorp was too slow to release developable land, which then delayed housing construction and contributed to the inability of the local housing market to meet demand. However, it is clear that Landcorp has a serious dilemma here. If they release large areas of land prior to the project being approved they could over-supply the market and contribute to a crash in local property prices. Should the project not proceed, then the longer term implications of excessive supply could be quite considerable for existing landowners in the town. In contrast, by delaying the release of land they can contribute to the sorts of supply constraints that are now affecting Onslow. While these may be resolved over time as Landcorp releases land and new housing eventually comes on stream, the short term impacts are severe. One potential solution here is for Landcorp to subdivide land and prepare it for sale through the provision of power, water, etc. to the sites but not release blocks onto the market. In anticipation of a project being approved, optional purchase arrangements may be put in place with potential buyers. As it stands, Onslow is struggling with such a severe housing bubble, leading one resident and landowner to comment that at least now “people can afford to leave before the town is ruined.”

3.6.2 Essential Services and Infrastructure

The growth of population is now showing signs of placing significant strain on essential services, particularly healthcare. The local hospital has not seen any significant improvement or expansion since opening in 1965. Although it is still in use, it is no longer fit to serve its purpose (Western Australian Planning Commission, 2011). Major redevelopment has been planned through the Western Australia Clinical Services
Framework 2010-2020 (Department of Health, 2010), yet, surprisingly, this plan did not account for the population influx associated with the major resource projects. This is despite the fact that the study was conducted after Chevron had announced its intention to develop Wheatstone and the extensive body of impact studies that were being prepared as the health plan was developed. As a result, the plan has not been put into practice and will need to be reviewed, delaying the implementation of upgrades and expansion. As part of an agreement with the State Government, Chevron has committed to donating funds to the redevelopment of the hospital, but this has not yet resulted in any material differences in health care service provision.

Other significant regional planning problems associated with rapid growth relate to basic infrastructure. A problem reported repeatedly during interviews was the unreliability of the local electricity supply. Residents mentioned how power outages had noticeably increased since construction on the major gas projects commenced. This affects not only local home life, but also businesses, as it leaves many temporarily unable to operate. A report prepared by the Western Australia Planning Commission (2011) validated these accounts, identifying power supply as one of the biggest areas of need in the community. Not only does the declining quality of service add to community dissatisfaction among residents, but also contributes to the cost of living problem as the inability to provide new developments with reliable power is one of the factors hindering the release of new lots in the Onslow townsite (Western Australian Planning Commission, 2011).

There are plans to improve power generation for the community and industrial sites. Chevron intends to provide its own power for the camps and facilities, and will contribute to the construction of a new power station in the community (Department of State Development, 2012). Despite this funding being available, and notwithstanding the known lead-time for the new projects, a power planning study was only carried out in early 2012. The utility infrastructure upgrades for the community are planned to commence in 2015, meaning that residents will have to continue with the current supply until that time (Plate 3.1).
3.7 Regional Policy and Planning Responses

The two examples of housing and essential services and infrastructure help to illustrate the nature of the challenges facing Onslow. In many respects, the trends reported here are not unique. They are familiar to many rapid growth resource towns and have often been reported in the literature (e.g. Brown et al., 1989; Gilmore, 1976; Haslam-McKenzie, 2009). Perhaps what is surprising though is that the lessons of these previous experiences have not been learned, and policy and planning systems still seem unable to cope with rapid development. The most significant gains seem to have been made in the area of impact assessment and problem identification (e.g. Department of State Development, 2012; Western Australian Planning Commission, 2011). While 2012 saw the release of the Onslow Expansion Plan (Pilbara Cities, 2012), detailing how some of the local strategic planning needs would be addressed, this comes on the cusp of the first phase of construction – nearly four years after Chevron signalled its intent to develop.

Under the formal State Development Agreement to establish the project, Chevron’s commitment to provide financial support for community and infrastructure development
ought to have contributed to a more rapid response to the future growth challenges. The fact that plant construction is underway and many of these community infrastructure projects have yet to begin points to the temporal mismatch between commercial decision-making and government action. Traditionally, this mismatch is attributed to the availability and use of public funding. But is this actually the case in Onslow, and contemporary Western Australia more generally?

One policy that has greatly emphasized the integration of increased economic activity and investment into communities is the 2008 Royalties for Regions Act. In essence, this policy is about countering the concentration of capital generated by resource industries in Perth through spatial redistribution (McLure, 2008; Tonts et al., 2013). The State Government has committed to reinvest 25 per cent of the income from mining royalties (over and above current public funding) in non-metropolitan areas (Department of Regional Development and Lands, 2012). The scheme explicitly takes the financial benefits of increased resource related activity and invests it to meet the communities’ service, infrastructure and other needs. The amount of funding directed into non-metropolitan areas from the scheme is substantial. In the 2011/12 financial year, nearly A$1.5 billion was allocated, of which A$422 million was for ‘cross regional’ projects, while the remainder went to individual regions (Government of Western Australia, 2012). For Onslow this includes a A$10 million investment in a community development fund to cover key infrastructure and service upgrades.

Thus, despite the financial resources available to Onslow through both government and industry initiatives, the needs of the community are still outpacing the implementation of new infrastructure and services. While multiple schemes, goals and initiatives do provide some direction and aim for local development, interviews conducted locally suggest that it can also hinder the efficiency of meeting the immediate needs within the community. Perhaps most evident in the case of Onslow is that both overlapping and disjointed distribution of responsibilities between interdependent government organizations and agencies limits the efficiency and efficacy of meeting the objectives set out.

It is, of course, easy to take aim at government agencies for the slow delivery of services and infrastructure in rapid growth communities. The reality is that the provision of social, economic and cultural services and infrastructure is complex, and often hindered by governmental agency structures, project complexity, competing demands and priorities, and
remoteness. One suggestion that appears to have some merit is the notion of implementing a ‘development authority’ similar to those used in Western Australian urban redevelopment projects. These statutory bodies have responsibilities cutting across portfolios in order to ensure projects move quickly and in an integrated way. In remote resource towns, this approach has the potential to manage the entire development/expansion phase, incorporating aspects such as planning, land administration, regional development, environment, and even some of the essential service providers. Similar moves have already been made further north in the larger resource towns of Port Hedland and Karratha. Here, the Pilbara Cities office is charged with providing cross-agency direction to development with the aim of increasing the population and enhancing liveability (Pilbara Cities, 2012).

When coupled with the emerging governance arrangements that incorporate mining companies (e.g. Cheshire, 2010; Cheshire et al., 2011), such a structure may offer a means of helping towns transition quickly from the project inception stage to the maturity stage described by Gill (1990; 1991) and help avoid Gilmore’s (1976) colourful description of ‘near panic’ during the development phase.

### 3.8 Conclusions

In many respects, Onslow is typical of the challenges facing rapidly growing resource communities. It is a small, remote community being drawn rapidly into global circuits of capital through enormous investment in new resource projects, and finds itself struggling to cope with the implications of this. It is clear, however, that policy-makers and planners have much better insights into the implications of rapid growth than might have been the case in the past. Indeed, there is now a detailed body of work on the impacts of development, ranging across population growth, land release, housing, infrastructure, and service provision. There is also a closer relationship between companies, government and community than has often been the case, with Chevron investing considerably in community assets as well as in the project itself. Yet, despite the advances made on these fronts, we again find a community that is rapidly being overwhelmed by the speed of development, largely as a result of government investment being unable to keep pace with the development of the resource project. For residents of Onslow this is having a material impact on their quality of life. While it is evident that towns do eventually adjust and adapt following rapid growth (e.g. Rolfe et al., 2007; Smith et al., 2001; Tonts et al., 2012), there remains a pressing need for planning and policy responses that better deal with the immediate start up and developmental phases of new projects.
Chapter 4: Exploring Perceptions of the Impacts of Resource Development: A Q-methodology Study

4.1 Prologue

This chapter was published as a paper in the journal *Extractive Industries and Society* (2015, doi:10.1016/j.exis.2015.04.008) and builds on the case study of Onslow reported in the previous chapter by offering a comparative analysis of Onslow and Karratha. Where the previous study identified a number of the broad issues associated with growth and the responses in Onslow, this study focuses on the ‘lived experiences’ of residents and other stakeholders. The comparative study provides an opportunity to examine how places at two different points in the ‘resource cycle’ are coping with and adapting to change: Onslow as a small community only recently affected by rapid resource development, and Karratha as a larger centre with a long history of resource-led development.

This chapter also addresses a methodological and conceptual gap in the literature on resource communities. To date, research on changes in the economic, social and demographic structures of Australian resource towns have tended to involve either broad cross-sectional analyses across multiple localities, or have involved narrow single town case studies focused on quite specific issues, such as housing, service provision and employment. Yet local experiences and perceptions of rapid resource-led development are likely to be diverse and multifaceted. This study uses Q-methodology to explore local residents' experiences and perceptions of change. It identifies quite distinctive sets of experiences both within and between each community. The findings suggest that the implications of resource development are highly nuanced, and dependent not only on individual experiences, but also local histories, cultures, and values.
4.2 Introduction

The volatile nature of resource extraction and the social and economic impacts of this on rural communities has long been a subject of interest amongst social scientists (e.g. Hayter and Barnes, 2001; Innis, 1956; Lucas, 1971; Wilson, 2004). Research on this topic has been particularly prominent in the United States and Canada, where resource extraction has been examined in the context of, *inter alia*, demographic change, economic activity, employment, social cohesion, wellbeing, and environmental management (e.g. Halseth, 1999a; Kotev and Rolfe, 2014; Nord and Luloff, 1993; Randall and Ironside, 1996; Ryser et al., 2014; Smith et al., 2001). In contrast to the extensive body of work in North America, relatively little research has been done in other developed country contexts. This lacuna is particularly notable in Australia, where the fortunes of many rural and remote communities have long been tied to the extraction of mineral and energy resources (Lawrie et al., 2011).

From the mid-2000s, Australian researchers started to pay increasing attention to the impacts of a ‘once in a generation’ resources boom (Shann, 2012), drawing attention to the range of social, economic, and policy issues facing resource-dependent rural and remote communities. Some of the most prominent challenges were linked to the fast pace of development, including rising demands on housing, infrastructure and services (Ennis et al., 2013; Haslam-McKenzie et al., 2009; Haslam-McKenzie and Rowley, 2013), sharp increases in the cost of living (Haslam-McKenzie and Rowley, 2013), social dislocation and upheaval (Cameron et al., 2014; Petkova et al., 2009), and rising social inequality (MMSD, 2002; Reeson et al., 2012). Alongside this have been the contentious implications of fly-in/fly-out (FIFO) workforce arrangements in mining, which are viewed by some as draining economic and social activity out of regional communities (Commonwealth of Australia, 2013). However, it is also clear that resource-based communities are diverse, and that their experiences vary considerably according to location, commodity type, company structure, and the underlying socioeconomic structure (Chapman et al., 2015a; Lawrie et al., 2011).

While there is a growing body of literature on the broader regional implications and issues associated with Australia’s recent ‘resources boom’, much of this work tends to offer broad, cross-sectional quantitative analyses of multiple towns (e.g. Chapman et al., 2015a; Hajkowicz et al., 2011; Kotev and Rolfe, 2014; Reeson et al., 2012; Tonts et al., 2012). While these provide rich insights into the overall performance of different types of resource towns, the experiences and observations of residents are rarely examined in any detail. Those studies that do try to capture these ‘lived experiences’ tend to focus on a single or
narrow range of issues, such as service delivery, housing, crime, and social dislocation (Carrington and Pereira, 2011; Haslam-McKenzie and Rowley, 2013; Lockie et al., 2009; Scott et al., 2012). Rarely do these provide insights across multiple issues and concerns in an integrated way. Yet, residents’ experiences of community change in the face of rapid development (or decline) are likely to be multifaceted, cross-sectoral, and complex (Franks et al., 2011; Tonts et al., 2012; Tykkyläinen and Neil, 1995).

The purpose of this paper is to examine these complex and diverse perspectives by investigating local residents’ experiences and perceptions of rapid resource-led development. It aims to capture insights about some of the most contentious aspects of resource-led growth, including: fly-in/fly-out mining; cost of living; social cohesion and dislocation; distributional equity; reinvestment patterns; long-term sustainability; and, environmental impacts. The paper draws on a comparative assessment of two rapidly expanding resource-dependent communities in the Pilbara region in Western Australia: Onslow and Karratha. The paper adopts a mixed methods approach, combining Q-sort methodology (see Stainton Rogers, 1995) with unstructured interviews. The next section of the paper provides a review of literature relevant to the paper, before describing the research methods. A summary of the empirical results and an interpretation of the specific results for each location are then presented, followed by a general discussion and conclusion.

4.3 The ‘Lived Experience’ of Resource Booms

Prior to the 1970s, the majority of research on mining communities fell into the sociological and anthropological tradition of ‘community studies’ (see Newby, 1986). These studies were largely ethnographic in approach and typically undertaken in a single community, focusing on the structure and dynamics of social relations, class, power, religion, and kinship networks (e.g. Dennis et al., 1956; Lantz, 1958; Lucas, 1971; Oxley, 1978). Central to this body of work was a deep understanding of the ‘day-to-day’ lived experiences of residents and how they coped with and adjusted to social and economic change (Newby, 1986). The resource ‘boomtown’ research in North America in the 1970s represented an extension of this tradition, though ushered in a more diverse set of research interests. This research emerged primarily in response to the very real policy and planning issues associated with rapid resource-led growth in the western United States and Canada as a result of the 1970s energy boom (see Brown et al., 1989). Early studies focused on the social dislocation caused by the pace of economic expansion and population growth,
pointing to social conflict and difficulties in providing social services and adequate housing (e.g. Gilmore and Duff, 1975; Kohrs, 1974; Little, 1977).

While both tradition of community studies and resource boomtown literature provided insights into how residents were experiencing and coping with change, they were not without critics (e.g. Brown, et al., 1989; Smith et al., 2001). The most consistent areas of concern included the tendency to focus on the idiosyncratic characteristics of a particular locality, an over-reliance on single-town case studies, and the often weak empirical evidence in support of claims regarding social dislocation (Brown et al., 1989; Wilkinson et al., 1982). In response, the research agenda started to move away from the uncritical acceptance of the ‘social dislocation’ thesis towards a broader set of interests that showed a greater appreciation for the diversity of experiences of both individuals and communities (Nord and Luloff, 1993). This includes studies across a range of issues, including socioeconomic wellbeing (Freudenburg, 1992; Smith et al., 2001; Wilson, 2004), indigenous peoples (Young, 1995), local economic adjustment and labour (Barnes and Hayter, 1994; Halseth, 1999a), and regional policy (Heisler and Markey, 2013; Markey et al., 2008).

In contrast to the large and diverse body of work on North American resource communities, similar research in Australia has, until very recently, been sparse. It was only with the onset of the recent minerals and energy resources ‘boom’ around 2004/05 that Australian social scientists began to examine more closely the economic, social and political implications of the expansion of extractive industries in rural and remote areas. As with the North American studies, the focus has been diverse, covering issues such as population growth, labour dynamics, socioeconomic wellbeing, indigenous development, and long-distance commuting (e.g. Langton, 2010; Measham et al., 2013; McKenzie et al., 2014; Storey, 2010; Tonts, 2010).

Australian studies of resource communities tend to fall into one of three broad groups. The first is a series of quantitative studies that aim to provide cross-sectional accounts of how the resource boom has affected socioeconomic wellbeing and economic development (e.g. Chapman et al., 2015a; Hajkowicz et al., 2011; Kotey and Rolf, 2014; Reeson et al., 2012; Tonts et al., 2012). These studies point to considerable diversity in the performance of resource towns and some of the underlying causes of this variability, including commodity type, location and other place-based characteristics. The second group of studies is focused
more on the analysis of policy documents and other secondary sources, and aims to provide commentary and critical analysis. These typically cover issues related to regional development and planning, social policy, and industry development (Everingham et al., 2013; Hunter, 2009). The third is a small body of qualitative or survey-based case-study research that generally focuses on a single town or region. These include studies of housing, services, crime, and social wellbeing (Carrington and Pereira, 2011; Haslam-McKenzie, 2013; Mayes, 2008; Tonts, 2010).

While these qualitative case studies have yielded valuable insights into the experiences of residents living in resource communities, they are limited by the focus on a single or narrow range of issues. Yet, for the residents of these communities their experiences and perceptions of the impacts of rapid resource-led growth are likely to be multifaceted and complex (Gilmore and Duff, 1975; Tykkyläinen and Neil, 1995), spanning aspects of social and demographic change, employment, service provision, and the environment (England and Albrecht, 1984; Gilmore, 1976; Ruddell and Ortiz, 2014). There are resonances here with the behaviouralist tradition of research in human geography that aims to understand how people experience change in given spatial context (Aitken, 1991; Argent and Walmsley, 2009; Gold, 1980). Central to much of this work is understanding the ways in which individuals perceive and respond to their environment, irrespective of how closely this aligns with the ‘reality’ or the perceptions of others (Argent and Walmsley, 2009; Boulding, 1956; Bunting and Guelke, 1979; Taylor and Fiske, 1975). These behaviouralist insights have, to our knowledge, not been applied in understanding the experiences and perceptions of change in resource communities.

One method used to assess how individuals respond to changes in their environment is Q-methodology (through an activity called a Q-sort). First reported in the 1930s (Stephenson, 1935), it has spread beyond its initial applications in psychology and has been used in geography, planning, economics and a range of other social sciences (e.g. Brown, 1980; McKeown and Thomas, 1988; Stainton Roger, 1995; Weber et al., 2008). In essence, the value of the approach lies in its ability to move from particular ‘individual’ narratives within communities to the analysis of a diversity of perspectives that are held by a group of participants (Previte et al., 2007). For a number of scholars, Q-methodology enables a ‘systematic approach’ to the study of human subjectivity (Goldman, 1999; McKeown and Thomas, 1988). Q-methodology involves participants ranking or ‘ordering’ a series of statements or objects related to the particular issue in question. The findings are analysed
using a Principle Components Analysis (PCA), which aims to identify commonly held beliefs or views shared across participants (Watts and Stenner, 2005). The focus is, therefore, on discerning general beliefs (constructs) with which participants agree, rather than the number of people who support these constructs (Dziopa and Ahern, 2011; Stainton Rogers, 1995). Technical details regarding the theory and application of Q-methodology are described in Block (1961), Brown (1980; 1993), Dziopa and Ahern (2011), Stephenson (1953), and Watts and Stenner (2005).

In a recent contribution, Previte et al. (2007) suggest that the approach offers considerable potential in rural social research, particularly in situations where understanding multiple and often competing perspectives on issues is important. While relatively few rural community studies have utilised Q-methodology to date, those that have tend to use the technique to provide insights into complex and/or contentious development and policy issues. These include studies on perceptions of major land use changes (Anderson et al., 2013), environmental values (Davies and Hodge, 2012), and sustainability projects (Hermans et al., 2012). To date, however, no known studies have used Q-methodology to examine resource communities and the challenges associated with rapid expansion of extractive industries.

4.4 Resources in the Pilbara Region

Much of the recent expansion of Australia’s resources economy has been concentrated in Western Australia. In 2004, output from the mineral and petroleum sector in Western Australia was valued at A$33.2 billion (DMP, 2005); by 2013 output was valued at $113.8 billion (DMP, 2014). Collectively these sectors accounted for 91 per cent of the State’s total merchandise exports and 48 per cent of the total national export income. The most important commodity in terms of value was iron ore, which accounted for $68.0 billion (60%) of the total income of mineral and petroleum resources within the State (DMP, 2014). However, the value of liquefied natural gas (LNG) also rose quickly. After iron ore, petroleum products (comprising mainly LNG) were the second most important commodity in 2013, valued at $24.7 billion (DMP, 2014). While it only made up 12 per cent of commodity exports, it is quickly gaining importance in Western Australia’s economy. The value of LNG production increased an average of 9 per cent per annum between 2002 and 2012, before growing 18 per cent in 2013, due to a new processing facility coming on-stream. Value is anticipated to grow over coming years as projects currently under construction become operational (DMP, 2014).
While these numbers offer a sense of the scale of the resource-led growth in Western Australia, they provide little insight into how these changes are affecting individual resource regions or communities. Within Western Australia, much of the expansion of the resource industry has occurred in the Pilbara region, in the State’s North West. The iron ore industry, developed in the 1960s, and the natural gas industry, developed in the 1980s, underpin the region’s economy and have undergone rapid expansion in the past decade as the demand for these commodities increased. Two towns that have been affected by this expansion are Karratha and Onslow (Figure 4.1).

Karratha has a history based exclusively on resource extraction, and was established in 1968 to support the expanding iron ore industry in the Pilbara region (Horsley, 2013). Another surge in development and population growth occurred with the establishment of the nearby North West Shelf Gas project in the early 1980s (Wilkinson, 1983). Karratha remains a hub for resource extraction in the Pilbara and has seen strong growth associated with most recent resource boom. While iron ore remains central to the town’s economy, it has been the expansion of gas extraction and processing that has driven much of the recent growth. The speed and scale of growth has led to plans of developing Karratha as the ‘City of the North’ with a projected population of around 50 000 people by 2035 (Pilbara Development Commission, 2014), which is triple its 2011 population of 16 475 (ABS, 2012).

Onslow is located approximately 300 km south of Karratha. Prior to 2001, the community had a fairly small population, ranging from 594 (1981) to a peak of 881 people (1991) (Shire of Ashburton, 2010). Economic activity traditionally revolved around fishing, salt mining, some tourism, and a yet inconsistent and modest oil and gas industry (Chapman et al., 2014; Haslam-McKenzie, 2013). In 2004, the Wheatstone gas field was discovered offshore and in 2008 Chevron announced its intention to develop the field and construct onshore LNG processing facilities 12 km from the town. Construction began in late 2011 and will require a workforce varying between 300 and a peak of 6500 people (Department of Planning, 2011). While most will be accommodated in work camps, the community has already experienced some degree of demographic change. Although the usual resident population at the 2011 census was only 667 people (ABS, 2012), the number of people enumerated there on census night (including temporary contractors, staff in work camps etc.) was over 1,100 people, with many of these employed in the construction and mining industries (ABS, 2012).
While these two communities are both experiencing significant change as a result of the expansion of resource industries, the experiences of each town is markedly different. The towns are at quite different phases in the resource project cycle. Karratha’s iron ore and LNG industries are now well established, and have experienced further growth as a result of rising demand for both commodities (Plate 4.1). The town also has a significantly larger and more diverse population than Onslow, although the majority of people in the town are linked directly or indirectly to the resource industries. Onslow, on the other hand, has remained relatively isolated from such developments and experienced slower and more limited growth to date. The town has never experienced development on the scale of the current plant construction (Plate 4.2). Yet, the projections are for a scale of development that would see the town’s population grow to over 3700 people by 2025 (Western Australia Planning Commission, 2011).

Figure 4.1: Map of Western Australia, showing the locations of Karratha and Onslow (Murphy, 2013).
Plate 4.1: Iron ore operations are well established in the Pilbara region. *Photo by Rachel Chapman, 2012.*

Plate 4.2: Components for the LNG plant are being transported by road train to Onslow. *Photo by Rachel Chapman, 2012.*
With modern workforce practices in the mining industry, these towns are also affected by fly-in/fly-out (FIFO) work (Houghton, 1993; Rolfe and Kinnear, 2013). This involves workers being flown from their place of usual residence - usually the Perth metropolitan area or another regional hub in the south of the State - to a remote location to work for an extended period of time (for example, working everyday for three weeks on site, followed by a week of time off, off site). They are then flown out of the remote location for their time off. This practice is controversial, and is viewed by some as reducing economic opportunities in mining regions, constraining population growth, and weakening social networks and institutions (Storey 2001, 2010). Operations in both Onslow and Karratha utilise a FIFO workforce. However, Karratha has a significantly larger resident workforce and also serves as a hub for FIFO flights to other regional areas. Resource operations in Onslow, on the other hand, are being constructed almost wholly with a FIFO workforce where workers are housed in a camp outside of the town.

4.5 Methods

Q-methodology was selected as the primary approach for this research, largely on the basis that it enables a systematic analysis of subjective experiences or perceptions (King et al., 1994; Previte et al., 2007). Moreover, it provides a basis for comparative analysis between the two locations on the same sets of issues. The added advantage of Q-methodology is that, where possible, it is administered ‘face-to-face’ with participants, thereby providing the opportunity to collect additional qualitative data as part of an unstructured interview. The process involved four steps: developing the concourse; selecting participants; administering the Q-sort; and analysing responses.

4.5.1 Developing the Concourse

In order to build a general overview of the issues that communities experience, the types of perspectives that might be important to residents were compiled through an analysis of local and State newspaper articles, letters to the editors of newspapers, comments on online articles, government and industry reports, and reports and statements produced by ‘interest groups’. The large number of perspectives derived from this overview represented both general and extreme points of view. These perceived impacts were then organised into themes derived from community impact and resource town literature. These general themes are: fly-in/fly-out mining; cost of living; social cohesion and dislocation; distributional
equity; reinvestment patterns; long-term sustainability; and, environmental impacts. These were then used to prepare ‘personal statements’ that aimed to capture the sentiment of the issues being raised. Two to three personal statements, often of opposing positions, addressed the specific issues within each of these themes. In total, there were 43 statements used in the study (reported in Table 4.1).

4.5.2 Selecting Participants

In Q-methodology, the range of potential perspectives is more important than having a high number of participants (Stainton Rogers, 1995). There is no definitive ratio of how many participants should be used relative to the number of variables/statements. Thompson et al. (1983) suggest several more variables than participants, while Watts and Stenner (2005) recommend a 1:1 ratio of statements to participants. In this study, the objective was to survey a cross-section of stakeholders who had an interest in the long-term economic and social wellbeing of the community and, in line with Thompson et al. (1983) sought an equal number of participants and statements. The targeted participants were local decision-makers (municipal government, local offices of government agencies etc.), local business owners, and long-term residents. Participants were recruited using the Chamber of Commerce and Industry directory, by contacting the office of the respective local governments, and through existing professional networks. This initial group of participants was asked to recommend other potential study recruits. At the conclusion of the fieldwork, there were a total of 20 participants from Karratha and 28 participants from Onslow.

4.5.3 Administering the Q-sort

'Q-sort' is the term used to describe the task of sorting the statements and for the individual responses. The Q-sorts were administered through face-to-face meetings with individual study participants. After a brief explanation of the aims of the study and the methodology, participants completed a questionnaire to collect basic demographic information. The 43 statements were written individually on cards and participants were asked to rank them based on how much they agreed or disagreed with each one, using a structured template (Figure 4.2). The template response was ordered from ‘Completely Disagree’ (-6) to ‘Neutral/Don’t know’ (0) to ‘Completely Agree’ (+6). Participants could move the statements around as much as they pleased until they were satisfied with the final rankings, as each box in the template could contain only one statement.
Table 4.1: The theoretical concepts, Q-sort statements, and factor scores for each component.

<table>
<thead>
<tr>
<th>No.</th>
<th>Statement</th>
<th>Kamahe Components</th>
<th>Onslow Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A FIFO workforce directly benefits local businesses.</td>
<td>-0.82</td>
<td>-0.176</td>
</tr>
<tr>
<td>2</td>
<td>A FIFO workforce is detrimental to our sense of community.</td>
<td>0.187</td>
<td>-0.126</td>
</tr>
<tr>
<td>3</td>
<td>A dramatic increase in population from an influx of workers makes this a safer community.</td>
<td>-0.219</td>
<td>0.023</td>
</tr>
<tr>
<td>4</td>
<td>FIFO is often unfairly blamed for common household and social problems.</td>
<td>0.702</td>
<td>0.284</td>
</tr>
<tr>
<td>5</td>
<td>FIFO is necessary for new large scale projects to succeed.</td>
<td>-0.791</td>
<td>0.074</td>
</tr>
<tr>
<td>6</td>
<td>FIFO workers do not spend money in the community in which they work.</td>
<td>0.759</td>
<td>0.154</td>
</tr>
<tr>
<td>7</td>
<td>Local workers are being passed over in favour of a FIFO workforce.</td>
<td>0.796</td>
<td>0.223</td>
</tr>
<tr>
<td>8</td>
<td>There are enough local workers to fill the jobs available.</td>
<td>0.613</td>
<td>-0.033</td>
</tr>
<tr>
<td>9</td>
<td>Aboriginal communities get little direct or indirect benefit from large resource projects.</td>
<td>-0.281</td>
<td>0.180</td>
</tr>
<tr>
<td>10</td>
<td>Consultation with traditional owners has a significant impact on the development process.</td>
<td>-0.651</td>
<td>0.179</td>
</tr>
<tr>
<td>11</td>
<td>All local residents have the opportunity to voice their opinions about the proposed development.</td>
<td>-0.696</td>
<td>-0.210</td>
</tr>
<tr>
<td>12</td>
<td>New large-scale projects contribute to social upheaval and a range of social problems.</td>
<td>0.199</td>
<td>0.511</td>
</tr>
<tr>
<td>13</td>
<td>Local residents have the best knowledge about community needs.</td>
<td>0.558</td>
<td>0.092</td>
</tr>
<tr>
<td>14</td>
<td>Many decisions regarding development have been made without consulting the local community.</td>
<td>0.396</td>
<td>0.465</td>
</tr>
<tr>
<td>15</td>
<td>New developments will ultimately lead to more diverse, interesting and liveable community.</td>
<td>-0.077</td>
<td>0.207</td>
</tr>
<tr>
<td>16</td>
<td>I see a need for this project in my community.</td>
<td>0.204</td>
<td>0.527</td>
</tr>
<tr>
<td>17</td>
<td>Accessible housing is a key issue in attracting and retaining workers for non-resource related industry and services.</td>
<td>-0.092</td>
<td>-0.042</td>
</tr>
<tr>
<td>18</td>
<td>Housing and rent prices do not affect economic diversification.</td>
<td>0.113</td>
<td>-0.173</td>
</tr>
<tr>
<td>19</td>
<td>New developments are contributing to increasing the cost of groceries and other goods.</td>
<td>0.519</td>
<td>0.076</td>
</tr>
<tr>
<td>20</td>
<td>The cost of living is a barrier to participation in community organizations and events.</td>
<td>0.169</td>
<td>0.189</td>
</tr>
<tr>
<td>21</td>
<td>The cost of rental accommodation is being made unaffordable by major new projects.</td>
<td>0.714</td>
<td>0.031</td>
</tr>
<tr>
<td>22</td>
<td>It is difficult for local businesses to retain employees due to high wages in the resource sector.</td>
<td>-0.145</td>
<td>0.421</td>
</tr>
<tr>
<td>23</td>
<td>Large-scale projects benefit the government more than the local community.</td>
<td>-0.267</td>
<td>-0.740</td>
</tr>
<tr>
<td>24</td>
<td>Large-scale resource projects provide economic benefits that are spread amongst all community members.</td>
<td>0.115</td>
<td>-0.374</td>
</tr>
<tr>
<td>25</td>
<td>There is an increasing divide between the incomes earned in the resource sector and those earned in other sectors.</td>
<td>-0.108</td>
<td>0.341</td>
</tr>
<tr>
<td>26</td>
<td>Wages have sufficiently increased in all sectors to compensate for the high cost of living.</td>
<td>-0.241</td>
<td>0.143</td>
</tr>
<tr>
<td>27</td>
<td>Local government will be able to respond to development pressures associated with new resource projects.</td>
<td>-0.121</td>
<td>0.492</td>
</tr>
<tr>
<td>28</td>
<td>The state government is responsive to the development issues facing this community.</td>
<td>-0.137</td>
<td>-0.010</td>
</tr>
<tr>
<td>29</td>
<td>The Commonwealth government is responsive to the development issues facing this community.</td>
<td>0.226</td>
<td>0.405</td>
</tr>
<tr>
<td>30</td>
<td>The Royalties for Regions scheme has had a positive impact on this community.</td>
<td>-0.055</td>
<td>-0.008</td>
</tr>
<tr>
<td>31</td>
<td>Adequate amounts of government revenue earned from this region are being reinvested in the region.</td>
<td>-0.197</td>
<td>0.580</td>
</tr>
<tr>
<td>32</td>
<td>Resource companies should directly invest in community development and improving local infrastructure.</td>
<td>0.026</td>
<td>0.149</td>
</tr>
<tr>
<td>33</td>
<td>Government support and investment for non-resource related sectors is evident in this community.</td>
<td>-0.211</td>
<td>-0.449</td>
</tr>
<tr>
<td>34</td>
<td>There has been a noticeable improvement in community infrastructure and provision of services due to resource-led development.</td>
<td>-0.055</td>
<td>0.778</td>
</tr>
<tr>
<td>35</td>
<td>The proposed development will bring necessary long-term planning for infrastructure and services provision.</td>
<td>0.055</td>
<td>-0.393</td>
</tr>
<tr>
<td>36</td>
<td>Resource-led development provides enough long-term jobs that we don’t need to worry about economic diversification.</td>
<td>-0.171</td>
<td>0.171</td>
</tr>
<tr>
<td>37</td>
<td>Once the resources are gone, this will become a ghost town.</td>
<td>0.223</td>
<td>-0.171</td>
</tr>
<tr>
<td>38</td>
<td>Resource-led development brings &quot;initial growing pains&quot; but creates great economic opportunities in the long-term.</td>
<td>-0.254</td>
<td>-0.087</td>
</tr>
<tr>
<td>39</td>
<td>Resource-led development provides crucial education, training and employment opportunities for remote communities.</td>
<td>-0.307</td>
<td>-0.458</td>
</tr>
<tr>
<td>40</td>
<td>The proposed development represents the progress necessary to keep the country going.</td>
<td>0.071</td>
<td>0.171</td>
</tr>
<tr>
<td>41</td>
<td>While resources are booming, our community should be investing in developing non-resource related industries.</td>
<td>-0.099</td>
<td>0.031</td>
</tr>
<tr>
<td>42</td>
<td>Preserving the environment is important for community sustainability and economic diversification.</td>
<td>0.109</td>
<td>0.495</td>
</tr>
<tr>
<td>43</td>
<td>Providing jobs is more important than environmental sustainability.</td>
<td>0.228</td>
<td>0.136</td>
</tr>
</tbody>
</table>
4.5.4 Analysing Responses

The results for each individual Q-sort were recorded and compiled in a database. To analyse the results, each of the statements were given a score corresponding with the column to which it was assigned by the participant. Following the conventions of Q-methodology, a Principal Component Analysis (PCA) was used to identify common groupings across all participants. The resulting scree plots were used to determine the number of components that should be considered for interpretation. The first point at which the plot exhibited a significant change in inclination was used as the cut off. The analysis of the scree plots (Figures 4.3 and 4.4) suggested that three main components be used for each community.

4.6 Component Interpretation

The three components represent similar groupings of variables, reflecting three general points of view for each locality. A score was calculated for all of the 43 statements to show how heavily each particular statement was weighted within each component (Table 4.1). A positive score means that statement ‘agrees’ with the component, while a negative score demonstrates ‘disagreement’. A significance level of ±.300 was used as the criterion for inclusion; if a statement had a score greater than .300 or less than -.300, that statement was considered in the interpretation of each of the emerging perspectives. The vast majority of the statements were significant for at least one component in each community. All statements were recorded as significant in at least one component between the two towns. This demonstrates the relevance of the range of statements to local sensibilities and perspectives, as well as the broad dimensions of community life being impacted by rapid resource development. The three components explained a similar amount of the variance within each community, accounting for 38.6% of variance in Karratha and 35.4% in Onslow. Table 4.2 shows that there is a fairly low correlation between the components in

![Template for the distribution of responses.](image-url)

**Figure 4.2:** Template for the distribution of responses.
both Karratha and Onslow. Moreover, the strong negative correlations and weak positive correlations between the two towns give an indication as to the differences between these communities.

**Figure 4.3:** Scree plot distribution showing the eigenvalues for Karratha components.

**Figure 4.4:** Scree plot distribution showing the eigenvalues for Onslow components.
Figure 4.5 shows the factor scores for each of the statements (listed in Table 4.1) for each component. Each vertical bar depicts the degree to which a specific statement explains the total variance for that component. Individual statements with scores greater than .300 or less than -.300 (represented by the dashed horizontal line) were considered for interpretation. This representation highlights the difference in opinion on individual statements, as well as the difference in perspectives between the two communities.

**Figure 4.5**: Graphic representation of the factor scores for each of the Q-sort statements for each component in each location.
Table 4.2: Pearson’s Correlations between the different components for Karratha and Onslow.

<table>
<thead>
<tr>
<th></th>
<th>Karratha Components</th>
<th>Onslow Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Karratha Components 1</td>
<td>1</td>
<td>0.1783</td>
</tr>
<tr>
<td>Karratha Components 2</td>
<td>0.1783</td>
<td>1</td>
</tr>
<tr>
<td>Karratha Components 3</td>
<td>-0.1779</td>
<td>-0.0336</td>
</tr>
<tr>
<td>Onslow Components 1</td>
<td>-0.5693</td>
<td>-0.4536</td>
</tr>
<tr>
<td>Onslow Components 2</td>
<td>-0.0673</td>
<td>-0.4536</td>
</tr>
</tbody>
</table>
| Onslow Components 3  | -0.0388 | 0.1732 | 0.2412 | 0.0229 | 0.0147 | 1

4.7 Emergent Viewpoints

This section reports on the components derived from the Q-sort analysis in each of the towns. It should be noted at the outset that the PCA undertaken as part of this analysis does not produce ‘discrete’ components that align with each individual, but instead draws out a set of common tendencies or perspectives across participants. This means that in some cases the same statements are important in multiple components, albeit ‘blended’ into a different mix. Karratha and Onslow are dealt with in turn, before a comparative analysis and discussion.

4.7.1 Karratha

There were three predominant perspectives identified in Karratha. These are the perception of Karratha as a semi-autonomous and prosperous place, Karratha as an exploited place, and Karratha as a utilitarian place.

*Component 1: Karratha as a semi-autonomous and prosperous place*

The dominant component that emerged in Karratha was that the local community performs best when external influences over decision-making are minimal. This component explains 17.5% of the total variance. This viewpoint emphasised the economic value of the mining
industry and the opportunities it brings, with little real need for diversification (statements 36, 41). While it was recognised that there are ‘growing pains’ associated with mining (statement 38), the view was that local residents have the best knowledge of the community’s needs, but were not being consulted in development decisions (statements 10, 11, 14).

In addition to decisions being imposed on the community, there was also strong opposition to the influx of external workers. FIFO workers were seen as being both socially and economically detrimental to the town (statements 1, 4, 6), while new projects and the associated labour force were seen as contributing to a rising cost of living (statements 19, 21). At the same time, the view expressed as part of this component was that residents wanted to see the development and support of a resident labour force, but that FIFO was the preferred model for employers (statements 7, 8). In summary, the overall perspective within this component was that the mining industry brought economic and other benefits, but external decision-making and FIFO contributed to some negative social and economic consequences.

Component 2: Karratha as an exploited place

The second view that emerged from the PCA explains 11.7% of the variance. It held that Karratha tends to receive a disproportionately small amount of the overall economic income derived from resource projects over both the short- and long-term. Within this component, there was the sentiment that further expansion of resource projects was unnecessary (statement 16), and that development decisions are being made without consulting residents (statement 14). A local business owner summed up the sentiments reported by many participants in stating, "We can't stop companies from doing what they're going to do." In addition, the component suggested that some residents are concerned that the benefits of resource development are not shared equally, as emphasised in statements 23 and 31. This view of inequality may stem from the notion that Karratha is a hub located in a region generating a considerable amount of the State’s revenue, but in relative terms, government reinvestment in the town is low (statements 23, 31, 34). Moreover, redistribution schemes, such as Royalties for Regions (see Tonts et al., 2013), were not having an adequate effect within the community (statement 30). Indeed, the view was that there was a lack of planning for infrastructure and the town’s economic future (statements 33, 35, 42). This seemed to be accompanied by a feeling that the community was being exploited for short-
term economic gains. A business owner and long-term resident felt that "everyone wants to rape the country as fast as possible, then the next generation will have nothing left."

Beyond the disproportionate distribution of benefits in a hierarchical sense, there was seen to be further unequal distribution of benefits within the community itself. A lack of support for non-resource industries has had serious implications for local businesses in these sectors (statement 33), particularly in terms of retaining labour (statement 22). To remedy this, businesses offered higher wages (statement 25), thereby economically disadvantaging the enterprise.

Component 3: Karratha as a utilitarian place
The third view was that Karratha is a place where people come to make money without being concerned with the long-term social and economic wellbeing of the town. It explains 9.3% of the total variance. This component placed a high value on jobs (statement 43), and while there was no perceived need for expansion of the resource industry (statement 16, 40), it was recognised as providing benefits to local residents, such as training opportunities and long-term employment (statements 9, 36, 39). This component suggests that residents are focused on the benefits and opportunities that industrial expansion provided. However, these advantages related only to personal and company gain, rather than benefitting the community as a whole. The significant role of industry in the town was emphasised by a local government representative who stated that "without industry, there is no reason for Karratha to be here." This reflected the sentiments reported by numerous respondents. It was not felt that resource companies had an obligation to invest in local infrastructure and services (statement 32), further supporting the view that the city is a place for profit. This notion of short-term gain was also reflected in the views on the actions of government, which was seen as being responsive to local needs (statements 28, 29), without long-term planning taking place (statement 35).

The views on labour force arrangements further supported the notion of Karratha serving as a place to be utilised to make personal or company gain. Using a FIFO workforce was seen as a necessary component of new, large-scale projects (statement 5) and not detrimental to the local sense of community (statement 2). Indeed, while conducting the Q-sort meetings, some residents claimed there was actually was no sense of community to be eroded. For example, a local government representative remarked, "What sense of community?" and a local business owner felt that "Karratha has nothing going for it." The favourable view of
FIFO and lack of concern with its local economic or social impacts within this component demonstrated the value placed on its economic utility, rather than any other intrinsic social or other values.

4.7.2 Onslow

The small size and remote nature of Onslow has led to it being, as one participant described, "the last of the untouched North West towns." Overall, residents seemed hesitant to voice full-fledged support for large-scale projects, worried that it would ruin the community's "small town feel". However, when issues related to impacts were examined in isolation, the general response was predominantly positive. The principal views saw Onslow as a place of equal benefit, a place that needs to plan ahead, and an entitled place.

Component 1: Onslow as a place of equal benefit

The dominant perspective that emerged in Onslow was that resource development has brought economic and social benefits that are equally shared. This component explains 16.9% of the total variance. It was perceived that residents have been involved in the decision-making process (statements 11, 14) and that changing needs of the community were being met with appropriate investments (statement 31). Resource development was seen as important for the community’s progress (statement 40) that brings with it social and economic benefits. Within this component, it was believed that these benefits were shared between all members of the community, as well as between the community and the government (statements 9, 23, 24, 25). Improvements, such as upgraded physical infrastructure (statement 34), new educational opportunities (statement 39) and increased economic opportunities (statement 38) were important indicators of the benefits and the view was that these benefits would continue to be realised long-term.

This perspective saw FIFO as further enhancing the community. It was recognised that the town did not have a sufficient population to fill the available jobs associated with large resource developments (statements 7, 8). This was reiterated by a local government representative, who stated that it was simply not possible to “get 5000 people to move here." FIFO was also perceived to generate more revenue for local businesses and was not believed to contribute to a rising cost of living (statements 1, 6, 19). Generally, this component was very supportive of the mining industry and the economic and social benefits it brings with it.
Component 2: Onslow as a place that needs to plan ahead

The second component in Onslow explains 9.7% of the total variance. Within this component, it was believed that residents were all experiencing some level of benefit, but that the government and resource companies should be investing more to ensure the community’s long-term sustainability. Some people were optimistic, with a local government representative stating that "we didn't have a future, now we do." Others saw the change as inevitable, such as the long-term resident who believed "the town would never be ready for a major influx of people, but it's coming, no matter what". Within this component, it was recognised that the introduction of new industry could bring 'growing pains' (statement 38), but the anticipated infrastructural and economic needs of the community had continued to be met. Immediate benefits had already been witnessed in the community (statement 31). Additionally, it was not felt that the cost of living had become unaffordable (statement 21), or that businesses could not compete with the wages offered in the resource sector (statement 22). These two facets have the potential to impede economic diversification and the community's long-term economic needs, but in this component they were not perceived to do so (statements 17, 18).

There was the sentiment within this component that economic diversity is important to support the long-term wellbeing of the community (statement 36) and to ensure the benefits of resource production are realised in the long-term (statement 38). There was also the view that the government was not investing enough into non-resource sectors (statements 31, 41) and that the resource companies should be investing in the community (statement 32). This view was backed by the notion that locals have the best knowledge of the town’s needs (statement 13). Despite the perceived short-sightedness, there was a sense that the community would endure beyond the life of the resource (statement 37). Overall, this perspective acknowledged the immediate benefits seen in the community, but recognised the need for long-term investment and planning.

Component 3: Onslow as an entitled place

The final perspective in Onslow concerns the belief that the government response to resource development brings physical and economic benefits, but has negative social implications. A local government representative summed this up, pointing out that residents "want all the good without the bad." This explains 8.8% of the total variance. Within this perspective, it was felt that local residents know best what the community’s needs are (statement 13) and that resource development in the area is unnecessary (statements 16, 40).
Despite this, all levels of government were perceived as responding to the needs of the community (statements 27, 28, 29). There has been noticeable investment into developing infrastructure, improving service provision, and supporting non-resource industries (statements 31, 33, 34). These, along with environmental sustainability, were thought to contribute to the long-term wellbeing of the town (statement 42). So, while it was felt within this viewpoint that large-scale resource development is not needed, there is a satisfactory level of economic, infrastructural, and services occurring growth within the community because of it.

Despite the recognition of this range of benefits, there were very negative perceptions within this component about the social implications of resource development. FIFO was seen as unnecessary for the project (statement 5). It was believed to bring social upheaval to the community (statements 4, 12). Numerous respondents commented that residents had been very opposed to having workers accommodated in town. However, those same people now complain that they are not seeing an increase in business. This has led to sentiments, as articulated by one business owner, that "if they're not going to support local business, we don't want them here." So, while this perspective was happy with the level of positive changes resource development has brought to the community, there was resistance to the negative social impacts believed to be associated with that same economic activity.

4.8 Discussion and Conclusion

This study builds upon previous research in Australia and elsewhere on the economic and social implications of rapid development in resource communities by exploring the diverse and multifaceted experiences and perceptions of local residents. The research quite deliberately aims to understand these experiences and perceptions across a diversity of issues, rather than to focus on a single or narrow range of concerns as has often occurred in other studies (Carrington and Pereira, 2011; Haslam-McKenzie and Rowley, 2013; Lockie et al., 2009; Scott et al., 2012). It also offers a form of systematic inquiry in Q-sort methodology, which allows for the complex and nuanced nature of residents’ views to be captured.

Given the markedly different perspectives that emerged from the same set of prompts, it is clear that there are significant differences in the way that people in these towns perceive or experience economic changes. In some cases, the major issues that emerged in Karratha
and Onslow were similar, but the perspectives on that issue varied greatly between the two localities. Perhaps the most obvious example of this was on the impact of fly-in/fly-out (FIFO) workforce practices. The issue dominated the first component in both towns, emphasising that this is indeed an important issue to people living in remote mining communities (Storey, 2001, 2010). However, the stance on the issue varied greatly. The predominant view in Onslow was that FIFO is an acceptable and necessary part of resource development, while the view in Karratha was that it undermines local job security and is detrimental to both the local economy and social cohesion.

The results of the research suggest that in addition to quite distinctive and even dichotomous views between towns on the same issue, there was also a high degree of overlap and nuance. The diversity of perspectives appears to be linked to the particular economic, social and political characteristics, and histories of these communities. These help shape (and are shaped by) local cultures, discourses, and identities that are ultimately reflected in lived experiences and perceptions of change (Behrisch, 1995; Ruddell and Ortiz, 2014). We would argue that the social and economic histories of places are particularly important. Karratha’s history as a ‘purpose built’ mining town means that it has witnessed rapid growth, economic downturns, and changing policy priorities, usually linked to the cyclical nature of the resource sector. Onslow, on the other hand, is a much smaller and more remote settlement, and emerged as a ‘traditional’ coastal town serving the pastoral and fishing industries long before Karratha. While Karratha has a history of cyclical development and upheaval, this is not yet evident in Onslow.

This cyclical nature of development has received some attention in previous studies of resources towns in North America and Australia (see Halseth, 1999a; Lucas, 1971; Tonts, 2010; Wilson, 2004). One of the themes these studies often touch on, but rarely explored in depth, is how these resource cycles affect the experiences of living in mining towns. The evidence presented here would suggest that the experience is highly variable, and is in part linked to the history of such cycles having played out locally in the past. In Karratha, there tended to be a more nuanced set of perceptions and understanding of the implications of mining when compared to Onslow, where the views largely centred on the benefits of resource extraction. There are some similarities in Onslow with Gilmore’s (1976) classic study of Gillette, Wyoming. This work pointed out that communities without a history of mining tended to emphasise positive impacts, including employment growth, business creation, and the likelihood of a growing diversity of social opportunities. Only later did
the potential problems associated with resource development become evident to residents. While there is some evidence of social dislocation and ‘growing pains’ associated with development (Chapman et al., 2014), the Q-sort analysis suggests that this remains limited. In contrast to Onslow, the sentiments that emerged in Karratha were more diverse and likely to point to some of the problematic aspects of rapid resource-led growth.

Given these quite different histories and expectations, it is perhaps not surprising that divergent views existed between the two towns on the issue of long-term economic development. In Karratha, all three of the components suggested that respondents were satisfied with the long-term job opportunities and direction of development. There was a view that economic diversification was not especially important. In large part this was because the town already has some diversity, both in terms of commodities (iron ore and natural gas), and its size, bringing with it a degree of diversity across sectors beyond mining, including transport and logistics, health, and education. In contrast, the Onslow components placed a greater emphasis on the need to secure long-term growth and diversification – perhaps reflecting its historic economic marginalisation. Again, this might be explained in part by the economic history of each location, and supports the findings of Massey (1991) and Behrisch (1995) who found that future labour market and economic expectations were heavily influenced by the environment in which they were formed. There are also strong resonances here with the emerging literature on path dependence in regional economies (Martin and Sunley, 2006; Tonts et al., 2014). The contemporary and future development trajectories of regional economies are often a reflection of their histories, which also shape local economic discourse, institutions, values and policy decisions. The views on the economic development needs of Onslow and Karratha can therefore be explained in part with reference to their histories.

The findings here also raise questions for regional development policy and practice. Over the past decade, regional policy in Western Australia has become increasingly attuned to the needs of the resources industry in both economic and social terms. With the need to invest in infrastructure and other initiatives that support mining directly (Tonts et al., 2013), it is also apparent that the social and economic needs of residents have been recognised. This includes efforts to improve service provision and local amenity to ensure that the benefits from mining return to the ‘source’ localities (Chapman et al., 2014). There has also been a greater emphasis on strategic urban and regional planning (Pilbara Development Commission, 2014; Shire of Ashburton, 2010).
Yet, the findings reported here suggest that perceptions about the effectiveness of these policy interventions and initiatives are mixed. In part this is likely to be because the pace of development is such that policy responses are not able to keep up with local needs and expectations. In addition, there may be a divergence between local demand and need from what policy is currently delivering. Central to this appears to be the need to appreciate the diverse experiences, perceptions, and needs of local residents both within and between resource communities.
Chapter 5: The Resource Boom and Socioeconomic Wellbeing in Australian Resource Towns: A Temporal and Spatial Analysis

5.1 Prologue

This chapter was published in *Urban Geography* (2015, vol. 36(5), p. 629-653). It develops a number of themes touched on in the previous two chapters, focusing on the diverse ways in which resource communities change and adapt over time. While the previous two chapters focus on the case studies of Onslow and Karratha, this paper examines socioeconomic performance in 33 towns across Western Australia over a ten year period. It also moves beyond the Q-sort and qualitative techniques used in Chapters 3 and 4 to offer a suite of quantitative insights. It takes socioeconomic performance to include unemployment, welfare dependence, and incomes and considers the extent to which these differ between places according to, *inter alia*, dominant commodity, company structure and a range of place-based factors. The paper also builds on the earlier work of Tonts et al. (2012) who offered a similar comparative analysis across geographic space, but pointed out that one of the missing elements of their study was change over time. Accordingly, this paper incorporates an assessment of how socioeconomic performance changes over time.
5.2 Introduction

Resource extraction is the backbone of the economy for many small, remote towns across both the developing and developed world. The implications of this dependence has long been of interest to social scientists, and has led to an expansive body of literature related to the economic, social, and demographic characteristics of ‘resource towns.’ This tradition has been particularly strong in Canada and the United States, where a diverse suite of themes have attracted attention, including patterns of settlement and development (e.g. Freudenburg, 1992; Gunton, 2003; Innis, 1956; Randall and Ironside, 1996), employment (Halseth, 1999a; Weber, 2012), social structure, dislocation and upheaval in boomtowns (e.g. Nelson, 2001; Smith et al., 2001; Thompson, 1979), local economic inequality (e.g. Leatherman and Marcouiller, 1996), and land use/resource conflict (e.g. Christopherson and Rightor, 2012).

Given the importance of mining to the Australian economy, it is perhaps surprising to find that, until recently, very few Australian studies have paid close attention to the interactions between resource extraction and the localities within which the industry is embedded. The rapid expansion of the resources industry over the past decade, driven largely by economic growth in China and other parts of Asia, has seen a growing interest in the implications of resource extraction for social and economic wellbeing in rural and remote towns (e.g. Carrington and Pereira, 2011; Commonwealth of Australia, 2013; Hajkowicz et al., 2011; Lawrie et al., 2011; Rolf et al., 2007). Yet, in both Australian and international studies, there remain two notable gaps in the literature. First, cross-sectional comparative studies of the socioeconomic performance of mining towns remain relatively rare (see Reeson et al., 2012; Tonts et al., 2012); more common is the single town or regional case study (e.g. Chapman et al., 2014; Pini et al., 2010; Tonts et al., 2013). While these provide rich insights into the experience of resource towns, they are unable to account for variability between locations on the basis of factors such as commodity, company structure, remoteness, and demographic structure. Second, where wider quantitative analyses have been undertaken, they rarely account for changes over time (e.g. Hajkowicz et al., 2011; Reeson et al., 2012; Tonts et al., 2012), and thus do not capture the effects of changes in commodity price, policy shifts, or the wider business cycle.

In this article, we begin to address these issues by examining socioeconomic wellbeing in a cross section of 33 Western Australian resource towns over the decade 2001 to 2011. We have three key aims in this study. The first is to explore spatial variability in the
socioeconomic performance of small mining towns across Western Australia. The second is to account for this heterogeneity through an investigation of the empirical significance of a set of theoretically informed determinants of socioeconomic wellbeing. The third is to account for the extent to which socioeconomic performance varies over time and how different drivers might account for this variability, thereby capturing change across the business cycle.

The section ‘Extractive Industries and Socioeconomic Wellbeing’ provides a brief review of the literature on resource dependence and socioeconomic wellbeing. The ‘Regional Context’ section looks at these concepts within the context of Western Australia. In section four, we operationalise the concepts identified in the previous sections. We specify an empirical model designed to test for the significance of these drivers of socioeconomic wellbeing. Based on the results of the general-to-specific modelling strategy, the ‘Discussion and Conclusion’ discusses the implication of the final models for understanding the socioeconomic wellbeing in small resource towns.

5.3 Extractive Industries and Socioeconomic Wellbeing

Resources have long played an important role in the economies of small, remote towns throughout Australia, Canada and the United States of America. Some common features reported in the literature on resource towns are that they are often dependent on a single commodity, situated in relatively remote locations and characterised by economic volatility and vulnerability (Plate 5.1) (Freudenburg and Wilson, 2002; Lawrie et al., 2011; Randall and Ironside, 1996; Wilson, 2004). Indeed, this last theme has underpinned a longstanding interest amongst social scientists in the socioeconomic wellbeing of people living in mining towns. Typically these studies operationalise socioeconomic wellbeing in multi-dimensional ways that capture elements of personal or household income, employment opportunities and rates of welfare dependence (e.g. Baum, et al., 2007; Hajkowicz et al., 2011; Nord and Luloff, 1993). Other measures have also been adopted, including various measures of economic inequality, occupational structure, and cost of living (e.g. Baum, 2006). In part, the adoption of different measures of socioeconomic wellbeing is driven by pragmatic concerns related to data availability, the spatial units of data collection, and temporal coverage.
These latter two issues are particularly relevant to studies of socioeconomic wellbeing in resource towns. Relatively few studies offer analyses that compare the different experiences of towns and even fewer attempt to capture changing levels of performance over the business cycle (notable exceptions include Hajkowicz et al., 2011; Randall and Ironside, 1996; Wilson, 2004). This absence of spatio-temporal insights is problematic in that the heterogeneity of mining towns and the temporal volatility are rarely captured in an integrated fashion.

This is a theme picked up in the seminal work of Innis (1956) in his analysis of the ways in which the availability of natural, or staple, resources shaped patterns of regional development in Canada. Innis noted that resource-led growth produced quite diverse regional development outcomes and was often highly volatile, closely linked to world commodity prices, the business cycle, and the finite nature of the resource base (Barnes and Hayter, 1992, 1999; Halseth, 1999a; Hayter and Barnes, 2001; Nord and Luloff, 1993; Wilson, 2004). He also pointed out that while resource-led development contributed to local economic expansion, the outcome was often a truncated form of development that did not necessarily result in vast improvements in the quality of life of those living in these settlements (see also Hayter and Barnes, 2001). This is because staples-led growth was typically associated with weak backward and forward economic linkages and rather modest local economic returns when compared to the value of the resources being extracted.
Moreover, economic diversification is a challenge because new investments tend to be directed towards improving the existing, profitable resource industry rather than into new, alternative sectors.

While Innis’ observations were based on the historical pattern of Canadian regional development, and more recent interpretations have also focused on Canada (e.g. Hayter and Barnes, 2001), an early study by McCarty (1964) concluded that staples theory was also useful in understanding the development of the spatiality of Australia’s economy. A number of recent studies have also drawn explicitly on staples theory to make sense of the economic and social structure of Australian resource towns and regions (also Altman, 2003; Argent, 2013; Tonts et al., 2013). In many parts of rural and remote Australia, single industry towns have evolved along very similar lines to those in parts of Canada and are characterised by economic volatility and relatively few opportunities for economic diversification.

In recent decades, there has been an increasing interest in both the challenges and the opportunities that a resource-based economy provides. The downside of a resource-based economy became a subject of increasing interest in the 1970s and 1980s, when the finite nature of many resource commodities and an increase in international competition contributed to the widespread closure of mining operations in many developed countries (see Bradbury and St. Martin, 1983; Himelfarb, 1976). The narrow economic base of many resource towns led to rapid out-migration, business closure, economic contraction, and service withdrawal (Neil et al., 1992). For those people that remained in these communities, high unemployment, poverty, and other social problems often became deeply entrenched.

The other element of staples-led development is rapid growth. In the early 1970s, as other commodities were contributing to hardship for communities, the global oil shock led to an energy boom in many small towns in North America, particularly the western United States (Krannich, 1979; Little, 1977; Wilkinson et al., 1982). The initial research on these towns suggested that the rapid influx of population into these towns often led to numerous problems and negative socioeconomic impacts (Gilmore and Duff, 1975). The rapid pace of development stretched services and infrastructure, undermined a sense of community and belonging, and was claimed to have contributed to problems such as drug use, crime, domestic violence and suicide (Gilmore and Duff, 1975; Kohrs, 1974; Little, 1977). The dramatic rise in population was also linked to an increase in the cost of living, particularly in terms of housing affordability. It is, however, important to stress that the boomtown
literature of the 1970s and 1980s is not without critics. Most notable amongst these criticisms was the weak empirical evidence to support key claims, a narrow temporal coverage that tended to overlook adjustment processes, and an over-reliance on single town case studies (Smith et al., 2001; Wilkinson et al., 1982).

In Australia, recent research has tended to reprise some earlier themes that had captured the interest of North American counterparts. This includes work on the impact of mine closure (McDonald et al., 2012; Pini et al., 2010), but has tended to give much greater attention to the socioeconomic impacts of the recent resources boom. This work has often pointed to similar forms of ‘social dislocation’ to those reported in the North American literature. As such, this research has reported on housing (un)affordability and cost of living (Haslam-McKenzie et al., 2009), rising rates of crime and social disorder (Carrington and Pereira, 2011), the inability of services and infrastructure to keep pace with development (Chapman et al., 2014), the social and domestic upheaval associated with fly-in/fly-out workforce arrangements (McIntosh, 2012), and the uneven social and economic benefits of mining, particularly in regard to Aboriginal communities (Langton and Mazel, 2008).

At the same time, there are studies that suggest that the impacts of resource development are highly variable in socioeconomic terms. For example, Lawrie et al. (2011) point to falling rates of crime, unemployment, and welfare dependence in a number of large resource towns. Similarly, research by Rolf et al. (2007) suggests that rapid resource-related growth does not necessarily contribute to long-term social dislocation, but that there is typically a period of adjustment and eventual stabilisation of economic, social, and political structures. The Australian studies have also typically been dominated by case study research that focuses on a single region and single (or small number of) town(s). Only recently have wider cross-sectional analyses begun to emerge that consider socioeconomic wellbeing from a broader comparative perspective (Hajkowicz et al., 2011; Reeson et al., 2012; Tonts et al., 2012). These studies point to the high degree of heterogeneity in Australia’s mining towns in terms of socioeconomic wellbeing. A range of factors that influence socioeconomic wellbeing have been identified, including the level of resource dependence, commodity type, location, and human capital. However, as Tonts et al. (2012) conclude, while the performance of towns is highly variable in spatial terms, one of the limitations of these studies is that they capture a single point in time, usually a census year. As a consequence, little attention has been paid to the influence of the business cycle, long-run changes in commodity prices, policy shifts, and processes of local adjustment. Thus,
one of the missing elements from recent studies is an explicit appreciation of how socioeconomic performance varies not only across geographic space, but also across time.

5.4 Regional Context

Since the arrival of the first European inhabitants, Western Australia’s economic development has been closely linked to extractive industries. Gold mining was the impetus for a large portion of the initial settlement of the State in the late 19th century and remained the dominant mineral commodity for about 70 years (Tonts et al., 2013). However, since the 1960s much of the State’s economic growth has been due to the extraction of iron ore and, increasingly, petroleum products. This growth is driven largely by a steadily increasing demand in Asia (DMP, 2013). While iron ore and petroleum dominate production, accounting for 73 per cent of mineral and petroleum exports in 2012, the resource base is diverse. In 2012, the State produced over 50 types of mineral resources from 975 operating mine sites (DMP, 2013). Additionally, there are 65 operating oil and gas fields in Western Australia; a number that is likely to increase given the large number of committed investments and rapid growth of the sector (DMP, 2013).

While the extractive industries have long been an important part of the Western Australian economy, the first decade of the 21st century witnessed particularly rapid growth. In 2001, the industry was valued at A$27.2 billion, representing an average increase of 8.4 per cent per annum over the preceding decade (DMP, 2002). Since then, the industry has grown, reaching a record high of A$108 billion in 2011 (DMP, 2013). This represents an annualised growth of approximately 14.8 per cent between 2001 and 2011. Although lower commodity prices caused the value of output to drop to A$97 billion in 2012, the volume of output increased and the industry recovered, setting a new record of A$113.8 billion the following year (DMP, 2013, 2014).

The desire for this study was to find a contemporary example of the impacts of the resource industry. It is because of the unprecedented scale and rapid growth of production from 2001 that Western Australia was chosen for this study. Examining communities from within one jurisdiction allows for consistency in data collection and reduces the possible influence that policy variation between States might have on socioeconomic wellbeing in mining towns. Moreover, the State has a diversity of resource commodities being mined, providing an opportunity to compare how these resources and their associated business structures and
‘political economies’ play out at the local level. Given the pace at which resource communities can experience change, ten years offers an adequate period of time over which to observe these impacts. The study attempts to capture the global boom period, from 2000 to 2007, and a more uncertain period following the global financial crisis, from 2007-2011. The use of census data from 2001, 2006 and 2011 allows this shift in economic climate to be roughly captured by breaking the study into two periods, from 2001 to 2006 and from 2006 to 2011.

The economic performance of Western Australia during the decade 2001-2011 is highly variable at the local scale. Indeed, it is the State’s small resource towns that are most exposed to the vagaries of the global economy and where the concomitant implications for socioeconomic wellbeing are most apparent. Indeed, for many of these settlements, resource extraction is the sole justification for settlement and remoteness often makes economic alternatives unviable (Haslam-McKenzie et al., 2009; O’Connor and Kershaw, 1999; Tonts et al., 2012). The State’s mining towns are typically small, with the majority having fewer than 5,500 residents (Tonts et al., 2012). The only towns larger than this, of which there are three (with populations ranging between 7,000 and 15,000), have more complex economic structures linked to ports and logistics, higher order service functions, and some processing activities. Thus, 5,500 represented a natural ‘break point’ in the population distribution of resource towns and only towns smaller than this are the focus of this study.

In addition to size, towns were selected on the basis of their dependence on resource extraction. Conventionally, the degree to which a local economy relies on mining activity can be measured using a location quotient (LQ) (see Stimson et al., 2006). This is a measure of local economic specialisation, comparing the proportion of local employment in a particular industry to that at the national level. A location quotient greater than 1 indicates an over-representation of a particular industry at the local scale. For this article, we define ‘highly specialised’ mining towns as those with a location quotient in mining greater than 2.5 (based on 2006 census data) (ABS, 2007). These criteria were selected to align with the study by Tonts et al. (2012) and resulted in 33 towns being selected for this particular study (Figure 5.1).

Table 5.1 summarises some of the characteristics of the towns that are often distinctive in resource communities, as identified in the literature. The median location quotient across the 33 towns decreased from 26.37 in 2001 to 8.70 in 2011. Variability also declined over
the same time period, indicating that the observed decrease is due to a rise in mining activity elsewhere in Australia (from 0.9 per cent of the total national employment in 2006 to 1.8 per cent in 2011), rather than any reduction in the level of activity within Western Australia. On average, the population of these towns grew over the ten year time frame, although growth rates were highly variable, with both the largest and the smallest populations amongst these towns being recorded in 2011.

Although education levels for the small towns in this study have improved over time, they consistently remained below those at the State level and did not keep pace with the Western Australia’s rate of improvement. The percentage of the population to have completed schooling to year 12 within the study towns increased from 25.6 in 2001 to 31.9 in 2011, compared to the State, which grew from 38.3 in 2001 to 49.2 in 2011 (ABS, 2002, 2007, 2012). The level of population mobility (as measured by the percentage of people living at the same address five years previous) also varied over time. While the State average for living in the same area five years prior remained between 51 per cent and 55 per cent, the average of these small mining town varied from 38 per cent (2006) to 45 per cent (2001). Population stability in resource towns is open to multiple interpretations. Some literature

Table 5.1: Descriptive statistics for case study towns (aggregated) and Western Australia (ABS, 2002, 2007, 2012).

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Western Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQ Mining</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Mean</td>
<td>26.37</td>
<td>18.98</td>
<td>8.70</td>
<td>20.0</td>
<td>12.97</td>
<td>6.31</td>
<td>3.83</td>
</tr>
<tr>
<td>Median</td>
<td>19.32</td>
<td>14.36</td>
<td>6.34</td>
<td></td>
<td></td>
<td></td>
<td>3.60</td>
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<tr>
<td>Completed Year 12 (%)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>25.58</td>
<td>27.58</td>
<td>31.92</td>
<td>25.70</td>
<td>26.74</td>
<td>29.08</td>
<td>38.28</td>
</tr>
<tr>
<td>Median</td>
<td>2.88</td>
<td>6.50</td>
<td>7.14</td>
<td></td>
<td></td>
<td></td>
<td>42.44</td>
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<tr>
<td>Aboriginal Population (%)</td>
<td></td>
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</tr>
<tr>
<td>Mean</td>
<td>13.28</td>
<td>12.55</td>
<td>12.88</td>
<td>4.81</td>
<td>3.83</td>
<td>4.61</td>
<td>3.16</td>
</tr>
<tr>
<td>Median</td>
<td>17.12</td>
<td>15.76</td>
<td>15.30</td>
<td></td>
<td></td>
<td></td>
<td>2.96</td>
</tr>
<tr>
<td>Living in same local area 5 years ago (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>45.06</td>
<td>37.61</td>
<td>41.71</td>
<td>44.07</td>
<td>67.23</td>
<td>43.09</td>
<td>51.80</td>
</tr>
<tr>
<td>Median</td>
<td>10.14</td>
<td>9.69</td>
<td>14.18</td>
<td></td>
<td></td>
<td></td>
<td>51.87</td>
</tr>
</tbody>
</table>
points to low income and a lack of transferable skills as contributing to the high rates of stability (Bell, 1996). However, given that population stability amongst the study towns was highest prior to the boom and lowest during ‘mid-boom’, we would suggest that the towns in this study align with other research that shows that workers are highly transient until they obtain job security (Halseth, 1999a). While the percentage of population that is Aboriginal remained consistently around 13 per cent for these study sites, it is considerably higher than the State average of 3 per cent. These characteristics align with general observations often cited in the literature of mining towns.

Figure 5.1: The 33 mining communities throughout Western Australia, identified by their predominant resource over the study period (Murphy, 2014).
5.5 Model Specifications and Methodology

5.5.1 Variable Definition


Based on the literature, we derived theoretical constructs of socioeconomic wellbeing, focusing on unemployment, income and welfare dependence. In large part these were selected on pragmatic grounds related to data availability. However, these are also consistent with both the theoretical perspectives and the measures of socioeconomic wellbeing used in other studies of rural and remote communities in Australia and elsewhere (e.g. Baum et al., 2006, 2007; Hajkowicz et al., 2011; Tonts et al., 2012). Using available data, we operationalised the suite of variables to translate them into an empirically testable model. Subsequently, the statistical significance of the hypothesised drivers of socioeconomic wellbeing was tested using an ordinary least squares (OLS) regression general-to-specific modelling strategy. These theoretical drivers and their relationship (positive, negative, or uncertain) to the measures of socioeconomic wellbeing are summarised in Table 5.2.

In much of the literature on small resource towns, the factors that are claimed to influence socioeconomic wellbeing can be divided into three groups: town characteristics, community liveability, and industrial organisation. In addition, each of these can be further subdivided into a set of potential determinants of socioeconomic wellbeing. ‘Town characteristics’ incorporates demographic features, income, and aspects of the local economy. ‘Community liveability’ includes local social and human capital, as well as affordability and cost of living. ‘Industrial organisation’ includes characteristics of the local labour force and economic structure of the town, as well as characteristics of the commodity produced. As with the dependent variables (related to socioeconomic wellbeing), these latent (theoretical) constructs are multi-dimensional and, accordingly, require multiple measures to capture their observable characteristics. The choice of independent variables used to measure these latent constructs was determined in part by the availability of data.
Overall, 24 specific independent variables were selected to test the potential drivers of socioeconomic wellbeing. Although town characteristics do not directly affect the extent of mineral reserves or value of production, previous studies show that demographic features such as population and population stability influence socioeconomic wellbeing (Halseth, 1999a; Little, 1977; Rolfe et al., 2007). Towns with a larger population act as hubs for social services, such as subsidised public housing. This can, in turn, affect patterns of internal migration, attracting people in need of social support, government housing, and specialised services (Hugo and Bell, 1998). The outcome for such localities can be lower incomes, higher unemployment rates, and higher welfare expenditure per capita than for some smaller settlements (Hugo and Bell, 1998). However, it is also possible that size may have the opposite effect for some towns as people may move to capitalise on more diverse job opportunities, higher incomes associated with more specialised services, and a wider range of social and cultural opportunities. A variable to measure the impact of the Aboriginal population is also included within the local demographics as this group often make up a relatively high percentage of the population in remote towns and tends to have dramatically different socioeconomic characteristics to non-Aboriginal inhabitants (Haslam-McKenzie et al., 2009; Langton and Mazel, 2008). Furthermore, while they often live in or within close proximity to mining towns, the extent to which the Aboriginal population benefits from mining projects is highly contested (Langton and Mazel, 2008).

Perhaps more directly related to socioeconomic wellbeing are the characteristics of the local economy. Mean income directly impacts the percentage of low income households. It is widely assumed that during resource booms, towns with highly specialised economies dependent on mining will thrive (Freudenburg, 1992; Stedman et al., 2004). Hence, the location quotient for mining is one of the variables under consideration. Other export-driven sectors that could provide potential economic alternatives or moderate the effects of the mining industry include agriculture and manufacturing. As such, the specialisation in these industries is also included, as measured through the location quotient for agriculture and location quotient for manufacturing. The ratio of mining to non-mining jobs is also included to measure the extent to which mining stimulates employment growth in other sectors as well as the importance of co-located ‘base’ sectors.

The liveability of a community is an important factor in remote and regional areas (Commonwealth of Australia, 2013; Haslam-McKenzie et al., 2009). Two important aspects of ‘liveability’ are affordability and proximity to service centres. The remote nature of
Western Australia’s regional towns is often reflected in a high cost of living. Thus, remoteness and cost of living have been included. Areas with a high cost of living might have sufficient wages to offset that increased cost. However, this may not always be the case and a high cost of living can have a direct impact on the socioeconomic wellbeing of local residents. Social assistance, such as welfare, can aid residents for whom the cost of living is problematic. Looking at only our dependent variable of welfare expenditure per capita could reflect a few people who are very heavily dependent on welfare income, or a widespread need within a town to ‘top-up’ their income. For that reason, percentage of population in receipt of Commonwealth benefits and average amount of welfare per recipient are included as independent variables. Similarly, the percentage of people who own their home gives an indication of the cost of living and the ability of residents to afford a home (Haslam-McKenzie, 2009). Having a high home ownership rate also indicates a sense of permanency and willingness to invest in the community. Along the same lines, human capital is measured with percentage of population with tertiary education and social capital measures civic engagement. Putnam (1993) observed that high civic engagement led to regions being more successful than those with low civic engagement. This study measures civic engagement using the measure of voter turnout for municipal elections, as this is the only level of government where voting is voluntary in Australia. While this is an imperfect measure of civic engagement, there are relatively few alternative indicators available at the spatial scale or for the time periods under investigation.

The ‘industrial organisation’ at the local level is assumed to have a direct impact on the socioeconomic wellbeing of the town (Freudenburg, 1992). A key component of this is the labour force. With a high cost of living in some of the towns in question, having two incomes per family is perceived by some to be a necessity. There is also a question as to the ability of women to be active in the labour force as the mining sector tends to be male dominated (Gier and Mercier, 2006). As such, female participation in the labour force is included. For a similar reason, percentage of part-time employment is included as it might be assumed that part-time employment would not be sufficient to compensate for the high cost of living. If a settlement is experiencing economic hardship, people may be discouraged from seeking work and ‘drop out’ of the workforce (Tonts, 2010). This would cause the unemployment rate to decrease, making it artificially appear that the economic conditions of the town are improving. To account for this, labour force participation rate is also included as an indicator within labour force characteristics.
Having a diverse economy is often perceived to increase socioeconomic wellbeing as other sectors can buffer economic shocks to the dominant industry (Freudenburg, 1992; Stedman et al., 2004; Wilson, 2004). Hence, the economic diversity of each town was calculated using the Shannon’s H Diversity Index, which measures the distribution of jobs across all sectors. Similarly, a categorical variable of whether the local mining activity is dominated by a single company or a single commodity is included. Previous research has indicated that towns producing multiple commodities tended to perform better in socioeconomic terms (Freudenburg, 1992). This is because the diversity in commodities, just as in the economy as a whole, can act as a buffer to economic shocks. The type of commodities that are produced also plays a vital role as different commodities perform differently on the global markets. Therefore, variables indicating whether the industry is dominated by iron, gold, or gold and nickel are included.

5.5.2 Data Description

A pairwise Pearson correlation is used to explore the relationship between the three measures of socioeconomic wellbeing (Table 5.3). The results from the 33 study towns reveal a positive and statistically significant (at the .05 level) relationship between welfare per capita and unemployment rate. The strength of this relationship decreases over time. The relationship between welfare per capita and percentage of low income households similarly becomes less strong over time, as they have a positive relationship in 2001 and 2006 and weak negative relationship in 2011. However, only in 2001 is this statistically significant at the 5% level. Unemployment rate and the percentage of low income households has a fairly strong correlation and highly significant relationship. The relationship between these three indicators and the level of resource dependence (location quotient for mining) is also included. The negative relationship between the level of resource dependence and the (negative) indicators of socioeconomic wellbeing indicate that for these years a high level of resource dependence increased socioeconomic wellbeing. However, this relationship does not account for the suite of potential drivers of wellbeing derived from the literature.
Table 5.2: Summary of the theoretical constructs, explanatory variables, and anticipated relationship to the indicators of socioeconomic wellbeing - welfare per capita, percentage of low income households ('low income') and unemployment rate (UER).

<table>
<thead>
<tr>
<th>Community Socioeconomic Wellbeing</th>
<th>Demographics</th>
<th>Income</th>
<th>Economy</th>
<th>Location</th>
<th>Affordability</th>
<th>Human/Social Capital</th>
<th>Labour Force</th>
<th>Economic Structure</th>
<th>Commodity Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Characteristics</td>
<td>Population</td>
<td>Mean Income</td>
<td>LQ mining</td>
<td>Remoteness</td>
<td>Price Index</td>
<td>% population with tertiary education</td>
<td>Female labour force participation</td>
<td>Economic Diversity</td>
<td>Single Commodity</td>
</tr>
<tr>
<td></td>
<td>Populations Stability (5 years)</td>
<td>Mean Income</td>
<td>LQ manufacturing</td>
<td>% of population to own home</td>
<td>% of workforce part-time</td>
<td>% population receiving welfare</td>
<td>% of workforce part-time</td>
<td>Single Company</td>
<td>Iron ore vs. other</td>
</tr>
<tr>
<td></td>
<td>% Aboriginal Population</td>
<td>Mean Income</td>
<td>LQ agriculture</td>
<td>Average welfare $$ per recipient</td>
<td>Participation Rate</td>
<td>Economic Diversity</td>
<td>Single Company</td>
<td>Iron ore vs. other</td>
<td>Gold vs. other</td>
</tr>
<tr>
<td></td>
<td>Low Income</td>
<td>Mean Income</td>
<td>Mining to non-mining job ratio</td>
<td>Average welfare $$ per recipient</td>
<td>Participation Rate</td>
<td>Economic Diversity</td>
<td>Single Company</td>
<td>Iron ore vs. other</td>
<td>Gold vs. other</td>
</tr>
<tr>
<td></td>
<td>UER</td>
<td>Mean Income</td>
<td>Mining to non-mining job ratio</td>
<td>Average welfare $$ per recipient</td>
<td>Participation Rate</td>
<td>Economic Diversity</td>
<td>Single Company</td>
<td>Iron ore vs. other</td>
<td>Gold vs. other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected Relationship</th>
<th>Welfare per Capita</th>
<th>Low Income</th>
<th>UER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Populations Stability (5 years)</td>
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<td>-</td>
<td>+</td>
</tr>
<tr>
<td>% Aboriginal Population</td>
<td>+</td>
<td>-/+</td>
<td>+</td>
</tr>
<tr>
<td>Income</td>
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<td></td>
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</tr>
<tr>
<td>Mean Income</td>
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<td>-</td>
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<tr>
<td>Economy</td>
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<td></td>
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<tr>
<td>LQ mining</td>
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<td>-</td>
</tr>
<tr>
<td>LQ manufacturing</td>
<td>+</td>
<td>+</td>
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<tr>
<td>LQ agriculture</td>
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<td>+</td>
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<tr>
<td>Mining to non-mining job ratio</td>
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<td>+</td>
<td>-</td>
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<tr>
<td>Location</td>
<td></td>
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<tr>
<td>Remoteness</td>
<td>+</td>
<td>-/+</td>
<td>+</td>
</tr>
<tr>
<td>Affordability</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Price Index</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% of population to own home</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% of population receiving welfare</td>
<td>-/+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Average welfare $$ per recipient</td>
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<td>-/+</td>
<td>+</td>
</tr>
<tr>
<td>Human/Social Capital</td>
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<td></td>
<td></td>
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<tr>
<td>% population with tertiary education</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Local voter turnout</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Labour Force</td>
<td></td>
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<tr>
<td>Female labour force participation</td>
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<td>-</td>
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<tr>
<td>% of workforce part-time</td>
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<tr>
<td>Participation Rate</td>
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<td>-/+</td>
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<tr>
<td>Economic Structure</td>
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<tr>
<td>Commodity Characteristics</td>
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</tr>
<tr>
<td>Single Commodity</td>
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<td>-/+</td>
<td>-/+</td>
</tr>
<tr>
<td>Iron ore vs. other</td>
<td>-/+</td>
<td>-/+</td>
<td>-/+</td>
</tr>
<tr>
<td>Gold vs. other</td>
<td>-/+</td>
<td>-/+</td>
<td>-/+</td>
</tr>
<tr>
<td>Gold/Nickel vs. other</td>
<td>-/+</td>
<td>-/+</td>
<td>-/+</td>
</tr>
</tbody>
</table>
Table 5.4 summarises the three measures of socioeconomic performance for the 33 case study towns for 2001, 2006 and 2011. While median welfare expenditure per capita decreased from 2001 to 2011, the data indicate variable degrees of change in inequality between towns. Both the average and the standard deviation peaked in 2006 before dropping in 2011, while the positive skewness increased steadily. This indicates that from 2001 to 2011 the majority of towns recorded falling levels of welfare per capita. However, within a small number of towns, the populations became increasingly welfare dependent. Through that time period, the average unemployment rate decreased from 7.52 per cent in 2001 to 5.42 per cent in 2011. The variability in this measure also declined, suggesting a more equal distribution of unemployment rates across the towns. In contrast, the percentage of low income households increased from 21.29 per cent (2001) to 23.74 per cent (2011). The increasing standard deviation indicates greater variability between those towns that are performing well and those that are not.

To explore the relationship between socioeconomic wellbeing and resource dependence, the towns were disaggregated by commodity type. Figures 5.2, 5.3 and 5.4 show the boxplots for each of the measures of socioeconomic wellbeing. There appears to be consistency

<table>
<thead>
<tr>
<th>Table 5.3: Pairwise Pearson correlation between the dependent variables and resource dependence.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LQ Mining</strong></td>
</tr>
<tr>
<td>2001</td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td><strong>Welfare Spend Per Capita</strong></td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td><strong>Unemployment Rate</strong></td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td><strong>% Low Income Households</strong></td>
</tr>
<tr>
<td>2006</td>
</tr>
<tr>
<td>2011</td>
</tr>
</tbody>
</table>

***p < 0.001, ** p <0.01, *p<0.05
within each commodity produced in the sense that, for each of the measures, towns tend to perform in a similar fashion according to commodity.

**Table 5.4:** Mean, median, standard deviation (SD), interquartile range (IQR), skewness, and kurtosis for the indicators of socioeconomic wellbeing (ABS, 2002, 2007, 2012).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>IQR</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Welfare Expenditure per Capita</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>346.92</td>
<td>301.83</td>
<td>210.69</td>
<td>234.36</td>
<td>1.78</td>
<td>4.41</td>
</tr>
<tr>
<td>2006</td>
<td>449.28</td>
<td>277.20</td>
<td>527.63</td>
<td>337.76</td>
<td>2.58</td>
<td>6.94</td>
</tr>
<tr>
<td>2011</td>
<td>314.75</td>
<td>189.23</td>
<td>355.79</td>
<td>226.48</td>
<td>3.07</td>
<td>11.61</td>
</tr>
<tr>
<td><strong>Unemployment Rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>7.52</td>
<td>6.29</td>
<td>4.45</td>
<td>6.64</td>
<td>.86</td>
<td>.13</td>
</tr>
<tr>
<td>2006</td>
<td>5.46</td>
<td>4.50</td>
<td>4.10</td>
<td>4.82</td>
<td>1.66</td>
<td>3.43</td>
</tr>
<tr>
<td>2011</td>
<td>5.42</td>
<td>5.22</td>
<td>3.34</td>
<td>5.00</td>
<td>.46</td>
<td>-.14</td>
</tr>
<tr>
<td><strong>% Low Income Households</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>21.29</td>
<td>20.65</td>
<td>11.61</td>
<td>16.10</td>
<td>.053</td>
<td>-.153</td>
</tr>
<tr>
<td>2006</td>
<td>23.37</td>
<td>23.18</td>
<td>13.50</td>
<td>21.43</td>
<td>-.08</td>
<td>-1.04</td>
</tr>
<tr>
<td>2011</td>
<td>23.74</td>
<td>23.22</td>
<td>13.82</td>
<td>19.39</td>
<td>-.09</td>
<td>-.03</td>
</tr>
</tbody>
</table>

This can be illustrated in the data for welfare expenditure per capita (Figure 5.2). These boxplots demonstrate how dramatically these statistics can change, based on the commodity type. Gold and gold/nickel towns have a significantly larger range and much more variability over the years than all other commodities. While these two commodities vary greatly, the medians and interquartile ranges for all other commodities decrease over the ten years.

The plots for unemployment rate show a similar pattern of different commodities having variable impacts on the towns (Figure 5.3). Towns where both gold and nickel are produced had the most consistent range over time compared to the other commodities. Both iron ore and bauxite towns show a large range in 2001 followed by significantly lower medians and a smaller range for 2006 and 2011. This suggests that between 2001 and 2006 either new mines opened or existing mines producing these commodities expanded, contributing to a decrease in unemployment. A similar phenomenon can be seen for gold between 2006 and 2011.

The consistency between commodity types is also shown in the data for percentage of low income households (Figure 5.4). Towns where iron ore is produced had the lowest median of low income households across the three observation periods. Conversely, bauxite towns had higher medians in this measure compared to all other commodities. The percentage of low income households in gold producing towns rose steadily across the 2001 to 2011 period, while the median of low income households in iron ore towns consistently decreased over the ten-year timeframe.

There are numerous factors contributing to the variation between towns producing different commodities. Perhaps most important are the ways in which different commodities are embedded within global circuits of capital. The iron ore industry has experienced long-term growth on the basis of sustained demand from Japan and China. The commodity is dominated by large multinational corporations, sold primarily through long-term contracts, and is also supported by a policy framework that offers considerable government concessions on royalty rate, the development of infrastructure and so on (see Horsley, 2013). Many of the settlements closely aligned to this industry were also established as

‘company towns’ in the 1960s and 1970s, and while they are now ‘open towns’, there is a legacy of community infrastructure, housing, and services that are likely to contribute to enhanced wellbeing. The anomaly here is Roebourne, which consistently had significantly higher rates of welfare expenditure per capita (Figure 5.2) and unemployment rates (Figure 5.3). Unlike many of the other iron ore towns, Roebourne was not a company town and had the highest Aboriginal population of all the study towns, greatly affecting the socioeconomic characteristics of the locality.

In contrast to the iron ore towns, those linked to nickel, gold, bauxite, and mineral sands have rather different characteristics. In the case of gold and nickel, two of the most volatile commodities in terms of global price, unemployment, welfare per capita, and low income households are all relatively high. This perhaps not only reflects price dynamics (and a tendency to sell on-the-spot price rather than long-term contracts), but also company structure and scale, with smaller mines (in terms of value of production and employment) and smaller companies dominating the industry. In the case of bauxite and mineral sands, both commodities are again volatile with the industries also co-located with other sectors (notably agriculture), which may influence their overall socioeconomic makeup.

5.5.3 Empirical Modelling

In order to test for the statistical significance of the suite of hypothesised drivers, we fitted an OLS model for the percentage of change of each of the three measures of socioeconomic wellbeing. Empirical modelling was conducted as a two-stage process. First, we fitted a conventional convergence model to determine the degree to which there is a common process driving socioeconomic wellbeing across the small mining towns.

The convergence model is specified as follows:

\[ Y_i(t) = \beta_0 + \beta_1 Y_i(t-1) + U_{it} \]

where \( Y_i(t) \) is the log of the measures of socioeconomic wellbeing, and \( \beta_1 \) measures the rate of convergence. If \( \beta_1 < 1 \), then socioeconomic wellbeing is converging across the towns over time period \( t-1 \) to \( t \) (i.e. 2001-2006 or 2006-2011).

In the second stage, the residuals for the fitted model were regressed on the suite of variables to determine the significance of each driver on local variability in performance.
around the convergence trend. That is, the following empirical model was fitted to this
general model specification:

\[ U_{it} = \beta_0 + \sum_{j=1}^{K} \beta_j X_{jit} + \sum_{l=1}^{M} \alpha_l D_{lt} + \varepsilon_{it} \]

where \( X_{jiti} \) is the value of the \( j \)'th explanatory variable of town \( i \). \( D_{lt} \) is the \( l \)'th categorical
variable, \( \beta_j \) (\( j = 1 \ldots k \)) and \( \alpha_l \) (\( l = 1 \ldots n \)) are the parameters estimated using ordinary least
squares (OLS) regression, and \( \varepsilon_{it} \) is a random error term intended to capture the variability
in \( U_{it} \) not accounted for by the suite of explanatory variables. The model is defined to be
cohercnt with the data if the errors are independent, homoscedastic, and normally
distributed (Kennedy, 2008).

Once a coherent empirical model for each measure of socioeconomic wellbeing was
derived, non-significant variables were eliminated using a general-to-specific model
selection strategy. In Monte Carlo experiments, this model selection strategy has proved to
be an efficient way to select a model that represents the ‘true’ data generation process. That
is, the process that is assumed to have generated the dependent variable (Hendry, 2000).

Given the large number of candidate variables relative to the number of resource towns in
the study, a two step, general-to-specific model selection strategy was employed. The first
involved a general-to-specific model selection of quantitative variables. Specifically,
variables with the least significance were removed individually in each iteration of the
model, until all remaining variables had an F-statistic less than .100. In step 2, the model
that resulted from this process was used as a baseline to which qualitative categorical
variables were added. These variables were company structure (multi- vs. single company),
diversity of commodity base (multi- vs. single commodity) and commodity type (iron ore vs.
other, gold vs. other, gold/nickel vs. other). In cases where it increased the adjusted R\(^2\) and
the model was congruent with the data, the variable remained in the final empirical model.

As might be expected, the general model specifications tended to contain a large number of
confounding variables. Nonetheless, the final models specified for each measure of
socioeconomic wellbeing are highly significant and correctly specified in the sense that
there is no evidence in the sample to indicate that the assumptions of OLS have been
violated.
5.6 Empirical Results

There is evidence to suggest convergence across Western Australian mining towns for all indicators across both time periods, with the exception of welfare expenditure per capita in 2001 to 2006 (Table 5.5). Somewhat paradoxically, in the following time period, welfare expenditure showed the fastest rate of convergence. Overall, there is evidence that unemployment rate disparities across the mining towns converged more rapidly than for percentage of low income households. From this, it can be inferred that unemployment rate and low income are geographically becoming less uneven. This occurs consistently across the different time periods. Other research has suggested that the rapid increase in mining is using the ‘excess’ labour force capacity across the State (Plummer and Tonts, 2013). However, the spatial inequality in terms of welfare per capita behaved quite differently, diverging from 2001 to 2006 and converging for 2006 to 2011. The reasons for this are not readily apparent, but it seems likely that in the early onset of the boom (2001-2006) the benefits in terms of reductions in welfare dependence were not fully felt across all localities. Indeed, they were quite variable. However, as growth in the resources sector gathered momentum, the benefits began to be distributed across the settlement system, driving convergence. All three of the final models account for a significant proportion of the variability in measures of socioeconomic wellbeing at the .05 significance level. However, the individual variables that are significant differ both across the indicators and over the different time periods. The results are summarised in Table 5.6.

| Table 5.5: Convergence statistics for indicators between 2001-2006 and 2006-2011. |
|---------------------------------|-----|-----|-----|-----|-----|-----|
| Welfare expenditure per capita  | Constant | β   | β std | R-Square | Adj R-square | F-Ratio |
| 2001-2006                      | -153.396 | 1.737 | .694*** | .481 | .464 | 28.753*** |
| 2006-2011                      | 176.452  | .308  | .457**  | .208 | .183 | 8.161**    |
| UER                            | .920     | .605  | .656*** | .430 | .411 | 23.357***  |
| 2001-2006                      | 1.89     | .646  | .794*** | .630 | .619 | 52.894***  |
| 2006-2011                      | .900     | .852*** | .726 | .717 | 82.176*** |
| % Low Income Households        | 2.282    | .861  | .841*** | .707 | .697 | 74.705***  |
| 2001-2006                      | 3.628    | .990  | .852*** | .726 | .717 | 82.176***  |
| 2006-2011                      | 3.628    | .861  | .841*** | .707 | .697 | 74.705***  |

***p < 0.001, **p <0.01, *p<0.05
Table 5.6: The final model specifications for the periods 2001-2006 and 2006-2011.

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<tr>
<th></th>
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<tr>
<td></td>
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<td>Std</td>
<td>Unstd</td>
<td>Std</td>
<td>Unstd</td>
<td>Std</td>
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<td>.000</td>
<td>.499**</td>
<td>.000</td>
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<td>Population</td>
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<td>.024</td>
<td>.859***</td>
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<td>.767*</td>
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<td>.767*</td>
<td>.000</td>
<td>.767*</td>
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<td>% Aboriginal</td>
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<td></td>
<td></td>
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<tr>
<td>Economy</td>
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<td>.925</td>
<td>.960***</td>
<td>.000</td>
<td>.767*</td>
</tr>
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<td>.682*</td>
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<td>Remoteess</td>
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<td>.682*</td>
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<td>.516***</td>
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<td>.044</td>
<td>.544***</td>
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<td>Local voter turnout</td>
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<td>Female labour force participation</td>
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<tr>
<td>Tom Price</td>
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<td>-.391**</td>
<td>.566</td>
<td>.221*</td>
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<tr>
<td>Paraburdoo</td>
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<td>-.633***</td>
<td>1.282</td>
<td>.518***</td>
<td>-.964</td>
<td>-.377***</td>
</tr>
<tr>
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<td>-.948</td>
<td>-.371***</td>
<td></td>
<td></td>
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<td>.376*</td>
<td></td>
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<tr>
<td>R-Squared</td>
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<td>.861</td>
<td>.501</td>
<td>.619</td>
<td>.704</td>
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<tr>
<td>Adj R-Squared</td>
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<td>.828</td>
<td>.408</td>
<td>.512</td>
<td>.621</td>
<td>.740</td>
</tr>
<tr>
<td>F-Ratio</td>
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<td>26.754***</td>
<td>5.416***</td>
<td>5.801***</td>
<td>8.481***</td>
<td>10.093***</td>
</tr>
</tbody>
</table>

***p < 0.001, **p < 0.01, *p<0.05 Unstd = unstandardised, Std = standardised
5.6.1 Welfare Expenditure per Capita

After controlling for convergence across the small mining towns, the variables that account for the variation in welfare expenditure per capita account for 74 per cent of the variation between 2001 and 2006. The relationship between these drivers and welfare expenditure per capita is largely consistent with the theoretical expectations. The percentage of population that is Aboriginal and remoteness have a positive relationship with welfare expenditure, while the ratio of mining to non-mining jobs, welfare amount per recipient, female participation in the labour force and economic diversity had negative relationships. However, there are a few factors that are not consistent with theoretical expectations. There is evidence in the sample of a positive relationship between mean income and welfare expenditure per capita. This suggests that as mean income increases, welfare expenditure per capita also increases. While this seems counterintuitive, it does support the notion that these areas might be experiencing a version the paradox of poverty amidst resource abundance. In other words, some residents in these towns were experiencing rising incomes, but there remained a less advantaged part of the population. The cost of living was another indicator that did not align with theoretical expectations. The negative relationship indicates that the less expensive it is to live in a particular region, the higher the welfare per capita.

Interestingly, while town characteristics, liveability, and local labour and economic characteristics were significant between 2001 and 2006, none of these contributed significantly to the understanding of variability in welfare expenditure from 2006 to 2011. After accounting for convergence in welfare expenditure per capita, the only remaining variables that are statistically significant are dummy variables for the towns of Paraburdoo and Kambalda. The former has lower welfare expenditure per capita than would be predicted, while the latter has higher expenditure than predicted. We conjecture this indicates that changes in welfare expenditure were more likely driven by large-scale, structural changes that similarly affected all towns (with those two exceptions), than more localised factors.
5.6.2 Unemployment Rate

Approximately 40 per cent of the variability in unemployment rates from 2001 to 2006 can be explained by a few select variables relating to the affordability, labour force, and economic structure of the settlement. Average welfare amount per recipient had a positive relationship, as expected. Likewise, female participation in the labour force, and the overall labour force participation rate were consistent with expectations. The one factor that varied from expectations in this time period was whether a town was a single or a multi-company town, although this was not statistically significant.

While affordability and industrial factors influenced unemployment rates from 2001 to 2006, town characteristics and liveability were the dominant drivers for the 2006 to 2011 period. Population, percentage of population with tertiary education, and local voter turnout all were not consistent with expectations, having a positive relationship with the change in unemployment rates from 2006 to 2011. We hypothesise that the positive relationship between unemployment rate and population could be due to the availability of services in larger centres, attracting those looking for work. Likewise, the positive relationship between unemployment rates and percentage of population with a tertiary education could be due to the fact that larger centres would also have a wider availability of services, such as financial, health, or social services, which may require employees with tertiary education. Unemployed people may move to towns in need of these services, consequently creating a positive relationship between these two variables. The cost of living and mean income within the town were also consistent with expectations, having a negative relationship with unemployment rates. We hypothesise that those who are unemployed are unable to remain in areas with a high cost of living, contributing to this negative relationship. Likewise, a low mean income could indicate high levels of unemployment.

5.6.3 Low Income

The percentage of low income households was the only measure that showed any degree of consistency in drivers between the two time periods. Interestingly, although many of the variables were significant, the nature of their relationship varied between the time periods. For 2001 to 2006, population size had the anticipated, although not statistically significant, negative relationship. In contrast, for the 2006 to 2011 time period, this relationship was positive and highly significant. Surprisingly, mean income has a strong, positive relationship with the percentage of low income households between 2001 and 2006. This
means that as the average income of the town increases, the percentage of low income households also increases, indicating an uneven distribution of wealth within the study towns. It also coincides with the strong positive relationship between welfare expenditure per capita and mean income in the same time period. In the 2006 to 2011 time period, the percentage of low income households and mean income has the anticipated result of a very strong and highly significant negative relationship. The change from positive to negative relationship suggests that wealth distribution across the mining towns is becoming more even. The only additional driver that was consistent between the two time periods was whether or not the main commodity produced is gold. In both time periods, this has a positive, but not statistically significant, relationship.

In addition to these common drivers, each time period had some variables that were influential only in one time period. The remaining factors that are significant only in the 2001 to 2006 time period were the cost of living and labour force participation rate, both of which had the anticipated negative relationship.

The drivers that were influential only between 2006 and 2011 indicate that the economic structure of the town was important. This is reflected in the fact that economic diversity, being a single- versus multi-company town and whether they produced single versus multiple commodities were the driving factors. Economic diversity had the anticipated negative relationship with percentage of low income households. This aligns with the literature and supports the emphasis of development policy on promoting economic diversification within resource towns. Being a single-company town had a negative relationship with low income. This is perhaps indicative of the difficulty of retaining a labour force in some remote towns, particularly where there are limited employment alternatives. Often, this difficulty is overcome by offering high wages, which has the potential to affect the percentage of low income households. Whether the town produces a single commodity and whether it was a gold producing town had the anticipated positive relationship. However, these were not statistically significant. One remaining driver of the percentage of low income households between 2006 and 2011 was the percentage of the population with a tertiary education. This is surprising, as higher education is often thought to provide more specialised and higher paid job opportunities. This positive relationship possibly indicates that places with lower income also have a greater need for professions such as social workers.
5.7 Discussion and Conclusion

The analysis conducted here suggests that a combination of wider global processes in concert with place-specific characteristics play a critical role in shaping geographically diverse socioeconomic outcomes in resource-dependent communities. Importantly, the study highlights that spatial variability is highly dynamic across time – something that was hypothesised in the earlier study by Tonts et al. (2012) but not empirically verified. The significance of temporal dynamics is evident in the structure and variability between the three variables across the ten-year study period. This variability highlights the difficulty in finding an accurate method to measure a multifaceted concept such as socioeconomic wellbeing across the business cycle. For welfare expenditure per capita between 2001 and 2006, town characteristics were the most significant explanatory factors. However, in the 2006 to 2011 time period, there was a complete switch, where the characteristics of the commodity produced, along with whether it was a single company town, were the key explanatory factors and town characteristics become less important. The change in unemployment rate from 2001 to 2006 and 2006 to 2011 experienced a similar turnaround, with affordability and labour force characteristics dominating in the earlier time period and town characteristics influencing the latter. The percentage of low income households is the only measure that experienced any level of continuity with some of the same drivers showing up in both time periods.

Looking across all variables and all years, it is useful to draw attention to the effects of human and social capital. In this case, human capital was measured with the percentage of population with higher education and social capital with the local voter turnout. Municipal elections are the only level where voting is not compulsory, and therefore suggestive of the level of community engagement by residents (Putnam, 1993). The literature often states that human and social capital is an integral part to building community. However, in this study these were rarely significant. For 2006 to 2011, there was a positive relationship with both the percentage of low income households and unemployment rates, meaning that as human and social capital increased, so did these two indicators. However, we would stress that these findings do not necessarily refute the important and positive contribution of human and social capital, but that they leave the question as to its measurement and importance as important areas for further investigation in the context of resource towns.

The high degree of spatial and temporal variability in socioeconomic performance raises important questions for regional policy and planning. One of the most common concerns of
policy-makers over recent years is the way in which the narrow economic base of these resource towns might increase levels of socioeconomic vulnerability. The evidence presented in this article suggests that these small resource towns are indeed subject to a range of wider global processes (e.g. commodity price fluctuations, trade policy etc.), and that while local attributes and characteristics are important many settlements remain locked into a classical Innisian ‘staples dependence’. Indeed, there is little evidence to suggest that these highly specialised and remote local economies have diversified either over the past decade or their longer histories. In reality, few economic opportunities exist for these places. The challenge then for policy-makers, resource companies, and local communities is how to ensure socioeconomic wellbeing in the face of this high level of dependence and volatility. This study points to the need for these stakeholders to move beyond narrow conceptualisations of what drives socioeconomic wellbeing and towards perspectives that account for considerable temporal and spatial heterogeneity.
Chapter 6: Uneven Development and Local Competitiveness in Western Australia’s Resource Towns

6.1 Prologue

This chapter is intended for submission to the journal *Growth and Change*. It builds on the cross-sectional analysis of the previous chapter by examining the spatial and temporal variation in economic growth during the mining boom across the same 33 small mining communities that formed the basis of Chapter 5. Western Australia's 'two-speed economy' is often assumed to occur between mining and non-mining towns. Yet, using shift-share analysis to examine employment growth, this study found that even mining towns experienced divergent levels of growth. Shift-share analysis isolates the amount of growth that can be attributed to structural and local factors. However, an identified shortcoming of the shift-share technique is the inability to explain the causes of differential growth. We attribute the local component of growth to local competitiveness and discern a number of conditions identified in the literature as contributing to economic growth. The extent to which these factors contribute to local competitiveness is tested using a linear regression. This overcomes the limitations of shift-share technique and reveals potential ways by which to maximise local employment growth. The chapter concludes by briefly discussing the implications this holds for policy.
6.2 Introduction

The past decade has seen the evolving geography of uneven development re-emerge as a topic of policy debate within Australia (Beer, 2012; Plummer et al., 2014; Stimson et al., 2009). In large part, the contours of this debate have been shaped by the ways in which the ‘resource curse’, or macro-economic trap, associated with the nation’s mining boom have reshaped the nation’s space economy (Goodman and Worth, 2008; Langton, 2010). Generally, the regions that are closely tied to mining have, in economic terms, tended to forge ahead of those that are driven by other industries (Plummer et al., 2014). As a corollary, the regional economies that are based on agriculture, manufacturing, tourism, and non-mining services were particularly hard hit, as capital and labour reoriented towards resource-based regions (Kotey and Rolfe, 2014; Measham et al., 2013). While academic researchers have a long history of describing and interpreting uneven development in Australia (Fagan, 1981; Fagan and Webber, 1999; Gibson, 1990; Stimson et al., 2001), such has been the extent of the recent spatial divide that policy-makers have begun to engage more actively with the phenomenon. Indeed, there is now a vibrant policy discourse about Australia’s ‘two-speed’ or ‘patchwork economy’ (Garton, 2008; Mitchell and Bill, 2006; Plummer and Tonts, 2013; Schandl et al., 2008).

Drawing on a suite of ideas that were primarily developed to address the dynamics of uneven development across the United States and European Union, much of the emphasis of recent policy has been on finding ways to enhance local and regional competitiveness (Annoni and Dijkstra, 2013; Durlauf et al., 2009; Huggins and Thompson, 2013). The outcomes have been spatially targeted investment in infrastructure and services, policy initiatives designed to enhance human capital, and regulatory reform and market liberalisation (Plummer et al., 2014; Tomaney, 2012; Tonts and McKenzie, 2005). Yet, competitiveness itself remains a fuzzy concept; rarely defined or subject to conceptual scrutiny in these policy contexts, and tending to be applied in a largely uncritical way. This conceptual slippage has occurred despite considerable recent attention being given to notions of local and regional competitiveness within the context of endogenous growth theory and the so-called ‘new regionalism’ (Harrison, 2007). Moreover, the focus in Australia has tended towards the differences between mining and non-mining localities, and suggests that improving ‘local’ competitiveness in the latter may reduce the emerging geographies of uneven development. This focuses on ‘local’ factors that are potential drivers of economic prosperity, overlooking a range of macro-economic realities, while also downplaying the considerable differences amongst mining regions and localities. Indeed, a
number of studies have pointed to quite diverse patterns of economic and socioeconomic performance across Australia’s resource communities (Beer, 2012; Fleming and Measham, 2015; Hajkowicz et al., 2011; Tonts et al., 2012).

Against this background, this paper has two aims. First, rather than assuming the primacy of ‘local’ factors in driving economic growth, we measure the relative importance of both the dynamics of competitive forces beyond the control of localities as well as local competitiveness in accounting for uneven development amongst small mining towns in Australia over the period 2001 to 2011. We do this by applying a shift-share analysis to employment data to decompose growth into structural and local competitive components. Second, we unpack how a suite of place-based factors account for variability in local competitiveness across these towns. To do this we develop an empirical model that is informed by recent theoretical literature on competitiveness and endogenous growth. The paper is organised into five sections. The first section provides an overview of recent literature on uneven development, competitiveness and economic growth. The second section outlines the methodology, while the third section presents the results. This is followed by a discussion and conclusion.

6.3 Uneven Development, Competitiveness and Endogenous Growth

Arguably, scholarly interest in uneven development was at its height during the 1970s and 1980s, as the combination of deindustrialisation and neoliberal policy responses reshaped capitalist economies across much of the development world (Bluestone and Harrison, 1982; Martin and Rowthorn, 1986). However, the pervasive nature of spatially uneven development has ensured that it has remained a topic of detailed enquiry amongst geographers, regional scientists and other social analysts (Sheppard and Barnes, 1990; Sunley, 2000; Swyngedouw, 2000). Given its extensive nature and the diverse range of disciplines that have engaged with the subject, it is perhaps not surprising to find an equally diverse set of theoretical interpretations of uneven development.

Amongst geographers, unpacking and interpreting uneven development was historically dominated by concepts and approaches derived from Marxian political economy (e.g. Harvey 1973; Massey, 1979, 1984). The emphasis was on capital’s ongoing quest for surplus value, and how this shapes the production of economic and social space (Herod, 1997). In her path-breaking work on spatial divisions of labour, Massey (1984) interpreted
the spatial reorganisation of jobs and industry in the United Kingdom during the 1970s and
1980s, arguing that the process needed to be understood with reference to multi-scalar
intersections of capitalist accumulation, politics, and class dynamics. For Massey, the
shifting geography of capitalist production was reconfiguring the spatial structure of
employment, leading to the emergence of new geographies of inequality.

The writings of Massey (1979, 1984), Harvey (1973, 1989) and others (Markusen et al.,
1991; Storper and Walker, 1989; Walker, 1978) led to a wide-ranging debate about the
causes of uneven development and the most appropriate political responses. Yet, the
influence of Marxian thought began to wane by the 1990s. The reasons for this are complex
and beyond the scope of this paper, but include the perceived limitations associated with a
‘grand narrative’ of capitalist development, the limited focus on individual actors and
agency, and a growing interest by geographers in cultural and other explanations (Maillat,
1995; Maskell et al., 1998; Swyngedouw, 2012).

More enduring have been the perspectives influenced by neoclassical economics, which
have been widely used by geographers, regional scientists and economists over much of the
post World War II period (Cass, 1965; Koopmans, 1965; Solow, 1956, 1994; Stiglitz, 1994;
Swan, 1956). While Marxian perspectives emphasise the perpetually disruptive and
disequilibrating rhythm of capital accumulation, neoclassical perspectives on economic
growth prioritise the notion that uneven development is largely a transitory process in
which the forces of market competition will (eventually) lead to regional convergence
(Abreu, 2014; Barro and Sala-i-Martin, 1992; Chatterji, 1992). In essence, long run
equilibrium is achieved through the movements of commodities, capital, and labour in
response to disequilibrium market signals of differential profitability, wages, and prices
(Cochrane and Poot, 2014; Plummer et al., 2014). In turn, the long run growth rate is
‘supply’ side determined by the equilibrium degree of capital intensity and the exogenously
given rates of technological change and population growth. Typically, variations in
economic growth rates can be accounted for in terms of differential rates of technological
change (Cass, 1965; Koopmans, 1965). One of the critical limitations of the neoclassical
growth model is that there is no theory of what determines the rate of innovation and
technological change. It is just given: “manna from heaven” (Robinson, 1953, as cited in
Rigby, 2000, p. 204; see also Lucas, 1988; Romer, 1986). As a corollary, and in contrast to
Marxian accounts of the evolution of the capitalist space economy, there is no explanation
for the persistence in spatial inequality.
Endogenous growth theory emerged in the 1980s largely in response to some of the limitations of neoclassical approaches. As with the basic neoclassical model, notions of competition and competitiveness are central to endogenous growth theory. However, a critical area of difference is that the ‘new’ growth theory treats technological change, innovation, and entrepreneurship as endogenous, rather than exogenous, factors (Lucas, 1988; Porter, 1990). When translated into the realm of local economic development, endogenous growth theory postulates that improvements in productivity and economic performance are often due to localised private sector activity and investment decisions, knowledge sharing, and the advancement of human capital (Romer, 1994). The role of institutions is also emphasised, particularly in terms of providing the rules and conventions that shape political and economic decisions, thereby affecting competitiveness (Stimson et al., 2005). Much of this research has been conducted through detailed case studies of cities and regions in an effort to unpack the place-based drivers of local growth (Lovering, 1999). This body of work points to the importance of, *inter alia*, institutional support for enterprise and innovation, infrastructure and services, human capital, and environmental amenity. This has directly influenced on regional policy and planning, with an increasing emphasis on ensuring that the purported local ‘drivers’ of growth are optimised (Kitson et al., 2004; Plummer and Taylor, 2003; Tonts, 1999).

While endogenous growth theory has become increasingly influential, a number of notable knowledge gaps remain, particularly in the context of understanding uneven development. Perhaps the most apparent of these is the tendency to downplay the role of demand in stimulating growth. To date, the vast majority of studies have focused on the ‘supply side’, often assuming that if the local drivers are all in place, growth will naturally follow (Fothergill, 2005). This is particularly problematic in resource-based economies, where local and regional growth is driven almost exclusively by international demand for commodities (Cochrane and Poot, 2014; Measham et al., 2013). The second apparent gap is in relation to the notion of competitiveness. Very rarely is there a focus on how competitiveness can be measured and how locally-led growth can be disentangled from wider structural effects.

In this respect, the work of Stimson et al. (2014) is significant; a shift-share analysis was used to separate local competitive effects from other structural processes (see also Stimson and Robson, 2004; Stimson et al., 2005). Moreover, they go on to consider how different local drivers help to account for local competitiveness, including human capital, labour
force characteristics and social capital (Stimson et al., 2014). Similarly, an earlier study by Plummer and Taylor (2001) on the drivers of regional growth across Australia draws on a number of theoretical constructs that are empirically measurable and consistent with endogenous growth theory. These encompass: i) technological leadership at the enterprise level; ii) knowledge creation and access to information; iii) local integration of small firms; iv) infrastructural support and institutional thickness; v) local human resource base; vi) power of large corporations; vii) inter-regional trade; and viii) local sectoral specialisation. Their most significant findings were the roles played by both the local human resource base and local sectoral specialisation in promoting growth, and the role of higher levels of infrastructural support and institutional thickness in retarding growth (Plummer and Taylor, 2001; Taylor et al., 2008).

The work of Stimson et al. (2014) and Plummer and Taylor (2001) provide a helpful framework for the analysis of local competitiveness and uneven development prior to the recent Australian resource boom. Both studies, however, assess performance across relatively large regions, rather than at the level of individual towns. Moreover, while both studies provide insights into the differential performance across different types of regional economies, including mining, the resource sector is not an explicit focus.

Although there is increasing commentary on the spatial implications of the resource boom, much of this draws attention to the differences between mining and non-mining regions despite a number of recent studies that note considerable variability in the socioeconomic performance of mining towns (Chapman et al., 2015a; Tonts et al., 2012). These differences are explained in large part by a range of place-based factors, including the commodity being produced, local company structure, the level of resource dependence, and remoteness (Chapman et al., 2015a; Tonts et al., 2012). The extent to which local competitiveness drives the uneven development of mining towns remains unexamined. Accordingly, the remainder of this paper builds on the approaches of both Stimson et al. (2014) and Plummer and Taylor (2001) to test the extent to which uneven development can be ‘explained’ by reference to competitiveness, and to assess the place-based factors that might contribute to this.
6.4 Methodology

In this paper we employ a three-stage research design to unpack the nature and degree of local competitiveness in determining the geography of uneven development across a selection of small mining towns in Western Australia. First, a convergence model is used to test for the overall trajectory of growth differentials across the set of mining towns. Specifically, this model tests the extent to which growth rates of mining towns (based on employment) are converging or diverging over the recent resource boom. The second stage applies a shift-share decomposition for local employment data to determine the role of both ‘structural’ and ‘local competitive’ effects on accounting of employment growth differentials (see Stimson et al., 2003, 2009, 2014; Plummer et al., 2014). In the third stage, we use a multivariate regression model to determine the extent to which a suite of theoretically informed local characteristics account for differences in local competitiveness across the set of mining communities.

6.4.1 Testing for Convergence

To test for convergence, an ordinary least squares (OLS) regression model was fitted for employment growth. The basis for this analysis is employment data over the census periods 2001 to 2006 and 2006 to 2011. This covers two important periods in the Western Australian resource economy. The period of 2001 to 2006 represents the initial years of the boom, with rising commodity prices driving increasing production and investment. The ‘height’ of the boom then occurred between 2006 and 2011. Even against the background of the global financial crisis, this period is characterised by major inflows of capital to support new projects and increases in production.

The convergence model is specified as follows:

\[ Y_{it} = \beta_0 + \beta_1 Y_{i(t-1)} + U_{it} \]

Where \( Y_{it} \) is the log of employment levels, \( \beta_1 \) is the rate of change and \( U_{it} \) is a random error term to account for any variation not explained by the initial employment level or rate of convergence. If \( \beta_1 \) is less than 1, then there is evidence that employment growth is converging across the towns over the time period \( t, t-1 \) (i.e. 2001-2006, or 2006-2011) (Valdes, 1999).
6.4.2 Shift-Share Analysis

Conventionally, shift-share analysis decomposes employment growth into three components. The first, ‘national share’, is simply the growth that can be accounted for as a result of the expansion of the wider economy. The other two components are the primary focus for this study. These are ‘industry mix’ and ‘local competitiveness’. Building on Plummer et al. (2014), we interpret the ‘industry mix’ component as the effect of the particular composition of industries in a locality on the rate of employment growth in that local economy relative to the rest of Western Australia. Because a shift-share decomposition is merely an accounting identity, the ‘local competitiveness’ effect represents all those factors that contribute to local economic growth that are not accounted for by the economic structure of the locality. Of course, in and of itself, this ‘residual’ growth is unexplained. This provides a rationale for employing regression based techniques to model the variability in local competitiveness effects across the set of Western Australian mining towns.

Formally, using shift-share techniques, the growth rates are decomposed by comparing the growth rate of employment in a specific industry \(i\) in a specific region or locality \(r\) to that of a wider reference economy over a defined time period \(t\) and \(t-1\). In this study, the ‘local economies’ are those of the 33 study communities, relative to the growth rate of the corresponding industry at the State level. The growth rate \(g_{ir}\) in employment in region \(r\) over the time period between \(t\) and \(t-1\) for industry \(i\) is therefore defined as:

\[
g_{ir} = \frac{e_{ir}^t}{e_{ir}^{t-1}} - 1
\]

With the total growth rate \(g_r\) for locality \(r\) defined as:

\[
g_r^t = \frac{\sum_i e_{ir}^t}{\sum_i e_{ir}^{t-1}} - 1 = \sum_i \phi_{ir}^{t-1} g_{ir}^t
\]

Where \(\phi_{ir}^{t-1} = \frac{E_{ir}^{t-1}}{\sum_i E_{ir}^{t-1}}\) is the local share of employment in industry \(i\).

Similarly, the growth rate \(g_i\) for industry \(i\) in the reference economy is:

\[
g_i = \frac{\sum_r e_{ir}^t}{\sum_r e_{ir}^{t-1}} - 1
\]
With a total growth rate \( g_N^t \) for the reference economy defined as:

\[
[5] \quad g_N^t = \sum_i^N \lambda_i^{t-1} g_i^t
\]

Where \( \lambda_i^{t-1} = \frac{E_i^{t-1}}{\sum_i^N E_i^{t-1}} \) is the share of employment in industry \( i \) in the reference economy.

Accordingly, the differential growth rate \( (A_r) \) shows how much growth is experienced in the local economy, relative to the wider reference economy and is defined as:

\[
[6] \quad A_r^t = g_i^t - g_n^t = \sum_{i=1}^N \phi_{ir}^{t-1} g_i^t - \sum_{i=1}^N \lambda_i^{t-1} g_i^t
\]

Differences in employment depend on the levels of employment of the local \( (\phi_{ir}^t) \) and reference \( (\lambda_i^t) \) economy, the industry growth rates within each of these economies, and the proportion of the economy that each of these industries compose. Conventionally, the industry mix \( (IM) \) is the local growth rate that would have occurred if each industry grew at the same rate of that in the reference economy \( (Armstrong and Taylor, 1985) \). This can be expanded to incorporate the level of employment in each industry at the local level, relative to the corresponding industry in the reference economy \( (Plummer et al., 2014) \):

\[
[7] \quad IM_r^t = \frac{\sum_{i=1}^N \phi_{ir}^{t-1} g_i^t}{\sum_{i=1}^N E_{ir}^{t-1}} - \sum_{i=1}^N \lambda_i^{t-1} g_i^t = \sum_{i=1}^N (\phi_{ir}^{t-1} - \lambda_i^{t-1}) g_i^t
\]

A favourable industry mix would have a high proportion of employment in fast growing industries. Conversely, an unfavourable industry mix would have a high proportion of employment in low growth industries. The industry mix accounts for growth due to the structure of the economy, changes to which are driven by broader structural processes. The residual is the ‘leftover’ positive or negative growth in an industry, once the growth of the broader reference economy is accounted for. This is interpreted as the local competitiveness \( (LC) \) and, when weighted by the proportion of local employment relative to the reference economy, is defined as:

\[
[8] \quad LC_r^t = \sum_{i=1}^N \phi_{ir}^{t-1} (g_i^{t-1} - g_i^{t-1})
\]

When combined, these equations give the shift-share decomposition:

\[
[9] \quad g_i^t - g_i^t = \sum_{i=1}^N (\phi_{ir}^{t-1} - \lambda_i^{t-1}) g_i^t + \sum_{i=1}^N \phi_{ir}^t (g_i^{t-1} - g_i^{t-1})
\]
This technique identifies the proportion of local employment growth due to broader structural processes across the state, and the amount that can be attributed to local competitiveness.

6.4.3 Modelling Local Competitiveness

To unpack the unexplained ‘residual’ derived from the shift-share decomposition, we model variations in this local competitiveness as a dependent variable in a linear regression model, with a theoretically informed suite of potential drivers of competitiveness acting as a set of independent variables (Plummer et al., 2014; Stimson et al., 2006). Conceptually, the multiple regression model is capable of estimating the effect of each specific variable on local competitiveness and the overall impact of the suite of variables in accounting for local competitiveness differentials. Formally, the regression model can be specified as follows:

\[
LC_r = \beta_0 + \sum_{j=1}^{K} \beta_j X_{jrt} + \sum_{i=1}^{M} \alpha_i D_{rt} + \varepsilon_{rt} \quad \varepsilon_{r} \sim N(0, \sigma^2)
\]

Where \(X_{jrt}\) is the value of quantitative variable \(j\) in locality \(r\). \(D_{i}\) is the \(i\)'th categorical variable (multi-company and commodity produced), when \(\beta_j (j = 1...k)\) and \(\alpha (I = 1...n)\) are the parameters estimated using ordinary least squares (OLS) regression. The random error term \(\varepsilon_{rt}\) captures the variability in \(LC\) that is not accounted for by the theoretically informed suite of variables. An empirically well-specified model, from which it is possible to make consistent estimates of the model parameters, needs to be congruent with the data. A congruent model is defined as one in which the unexplained variance is unstructured in the sense that the errors in equation [10] are independent, homoscedastic and normally distributed (Kennedy, 2008).

Once a general congruent model of local competitiveness was defined, we employ a general to specific model selection strategy to deduce a ‘final’ parsimonious and well-specified model from which it is possible to interpret the significance of the hypothesised determinants of local competitiveness. In Monte-Carlo experiments, this model selection strategy has proved to be an efficient and reliable method for arriving at an (unknown) data generation process (Hendry, 2000).
6.4.4 Variable Selection

As indicated in the literature review, local economic growth and competitiveness is a multifaceted concept, which is hypothesised to be driven by a suite of oftentimes ill-defined and ambiguous theoretical constructs. Building on the previous work by Stimson et al. (2005) and Plummer and Taylor (2001), we postulate a suite of drivers of local competitiveness that are consistent with existing endogenous growth theory and the new regionalism literature and, yet, are sensitive to the particularity of resource-based towns. Specifically, this suite of variables encompasses the processes of human and social capital formation, community development (nature and extent of local characteristics), and the nature of the overall local economic environment. The rationale for these variables is contained in Chapman et al. (2015a) but has been expanded here to include variables that are identified as being significant in endogenous growth theory. A mapping between these theoretical constructs, the empirically measurable variables, and the nature of influence on competitiveness, as identified by endogenous growth theory and the new regionalism, is summarised in Table 1 and outlined below.

Endogenous growth literature emphasises the local capacity to be competitive. Likewise, this study also places a greater emphasis on this construct, as is reflected in the number of *Local Human Resource Base* variables that might help to explain drive competitiveness. An enduring theme in the regional growth literature is the importance of the processes of both human and social capital formation (e.g. Porter, 1998; Putnam, 1993). In particular, these surrogate measures capture the emphasis on the importance of place-based knowledge creation, local understanding, social and commercial ties, and support of local institutions as promoters of local competitiveness (Asheim and Isaksen, 1997; Morgan and Piercy, 1996; Simmie, 1997; Stimson et al., 2005). These processes of human and social capital formation are thought to create environments in which people have the social structures to disseminate knowledge, creating areas of invention and innovation, which can contribute positively to increased productivity and growth (Grabner, 1993; Plummer and Taylor, 2003).

In this paper, we attempt to capture the local environment within which social interactions take place in terms of population characteristics. Specifically, while it is possible that a large population would minimise face-to-face interaction and hinder the sharing of skills and knowledge, the size of the local *population* may contribute to local competitiveness in
that a larger population would provide a larger pool from which skills, innovation and labour could be drawn (Halseth, 1999a; Little, 1977; Perroux, 1955). It seems plausible that there is a positive relationship between population and competitiveness in the context of relatively small mining communities. Similarly, population stability, as reflected in data on the rate of population turnover in a five year period, contributes to the sharing of knowledge and innovation by sustaining social and knowledge networks (Maillat, 1995). Mean income

Table 6.1: Summary of theoretical constructs, variables and anticipated relationship with local competitiveness.

<table>
<thead>
<tr>
<th>Local Competitiveness</th>
<th>Variable</th>
<th>Expected Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Human Resource Base</td>
<td>Population</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Population stability</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Mean individual income per annum</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>% with tertiary education</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Unemployment rate</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Participation rate</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Participation rate (female)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Participation rate (part-time)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>% home ownership</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Local voter turnout</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>% Indigenous population</td>
<td>-</td>
</tr>
<tr>
<td>Infrastructure Support and Institutional Thickness</td>
<td>% to receive Commonwealth benefits</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>General Purpose Grant</td>
<td>+</td>
</tr>
<tr>
<td>Knowledge Creation and Access to Markets</td>
<td>Remoteness</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Price index</td>
<td>-</td>
</tr>
<tr>
<td>Inter-regional Trade and the Nature and Extent of Local Demand</td>
<td>Mining to non-mining job ratio</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Economic diversity</td>
<td>+</td>
</tr>
<tr>
<td>Local Sectoral Specialisation and Power of Large Corporations</td>
<td>Multi-company</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Productivity</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Commodity produced</td>
<td>/+</td>
</tr>
</tbody>
</table>
is also included as it is a common indicator of economic growth and associated with local capacity to support innovation (Lundvall et al., 2002; Rocha, 2004).

Within the bounds of data availability, this paper considers multiple indicators of human capital formation. It is anticipated that percentage of population with tertiary education will positively contribute to competitiveness through innovation and the generation of knowledge. Unemployment rate is included as it is a common indicator of economic conditions. Participation rate in the labour force is also included, as economic hardship may discourage people from seeking work (Tonts, 2010). Female and part-time participation in the labour force are considered, as they could positively impact competitiveness through employment in sectors other than mining, which tends to be full-time and male dominated (Commonwealth of Australia, 2013).

Proxy (though imperfect) indicators of social capital are the percentage of home ownership and voluntary voter turnout for municipal elections, both of which demonstrate engagement and willingness to invest in a local community (MacLeod, 2001; McMillan and Chavis, 1986; Putnam, 1993), promoting local competitiveness. Finally, in the Western Australian context, there is considerable evidence that the presence of a local Aboriginal population can have a significant and often negative impact on local competitiveness, as they often have significantly different economic characteristics (Haslam-McKenzie et al., 2009; Langton and Mazel, 2008).

Over and above the individual effects of human and social capital formation, the role of Infrastructure Support and Institutional Thickness is both contentious and critical in determining local competitiveness. Typically, high levels of institutional support are considered within endogenous growth theory as promoters of local competitiveness (Lucas, 1988; Stimson et al., 2005). In contrast, neoclassically inspired models of local growth emphasised the role of institutional support in retarding local market-based competitiveness (Gough, 1996). Here, we employ a variable measuring the percentage of the population to receive Commonwealth Benefits (welfare) as an indicator of infrastructure support and institutional thickness. We would suggest that welfare payments tend to be directed towards those areas that are problematic in economic terms, and would therefore expect to find it negatively related to competitiveness. Another variable under consideration is the general purpose funding, provided to local governments by the Commonwealth Government to ensure the provision of equitable levels of services and effectiveness of local governments.
(Department of Transport and Regional Services, 2007). The role of redistribution schemes is debated in the literature, particularly in the local context. While some research sees it as undermining the efficiency in capitalist economies (Gough, 1996), other literature finds that being ‘favoured’ by a higher level of government promotes economic growth (Ades and Glaeser, 1995; Eaton and Eckstein, 1997).

A common theme running through both the new regionalism and endogenous growth theories is *Knowledge Creation and Access to Markets*, which includes the role of proximity to markets, inter- and intra- industrial spillovers, transportation and supply chains in enhancing local competitiveness (Scott and Storper, 1992; Scott, 1988). In the Australian context, a readily available measure of accessibility is provided by the Australian Index of Remoteness for Areas (ARIA). In Western Australian mining communities, remoteness is widely considered to be a significant factor limiting the competitiveness of local communities, at least in terms of the ability to transport goods, retain workers, and share knowledge and innovation (Jacobs, 1970; Taylor, 1992). Additionally, in many locations, particularly Western Australia, a remote location is also often associated with a high cost of goods and services (Commonwealth of Australia, 2013; Haslam-McKenzie et al., 2009). This affects both the cost of living and of operating a business. Accordingly, we include the *regional price index* in our model specification as a potential impediment to local competitiveness.

As was argued by Plummer and Taylor (2001), *Inter-regional Trade and the Nature and Extent of Local Demand* for good and services can be a key determinant of local competitiveness. Conventionally, this impact is captured by a local multiplier effect that in this paper is measured by the ratio of mining to non-mining jobs. It is anticipated that a high ratio of non-mining to mining jobs, and hence a high local multiplier will contribute to local competitiveness (Hartman and Seckler, 1967). Similarly, *economic diversity*, as measure by a Shannon’s *H* statistic, is seen as promoting local competitiveness to the extent that interconnections between local industries have the potential to contribute to knowledge sharing across industries, potentially contributing to innovation (Glaeser, 2001; Jacobs, 1969).

Finally, while the effects of *Local Sectoral Specialisation* and *Power of Large Corporations* on employment growth are captured through the impact of the structural, or industry mix, component of the shift-share analysis, there remains the possibility that this effect may play
out differently in different places. Put another way, the structural component may influence local competitiveness through the specific commodity produced or the degree of corporate control. This is particularly relevant in the case of small resource-based economies where having *multiple companies* operating in or near the town is thought to contribute to local competitiveness. This provides employment options for residents, more economic stability, and an environment in which innovation can be shared. An increase in *productivity* has been used as an indicator of growth (e.g. Baumol, 1986) and as a product of knowledge networks, diffusion of technology, and economic diversity (Asheim, 1977; Glaeser et al., 1992; Maillat, 1995). For this study, it was calculated at the local government scale and is a measure of the value of minerals and petroleum produced per worker. This incorporates numerous characteristics, such as the local workforce, the commodity produced, and levels of capital investment. The final consideration is the *commodity* that is extracted in or near each study community. How this affects local competitiveness is variable, and linked in large part to geological availability, quality, and global price.

6.5 Empirical Findings

6.5.1 Case Study Towns

The case study towns used in the analysis are the same as those that form the basis of the analysis in Tonts et al. (2012) and Chapman et al. (2015a). To determine whether these small towns were ‘mining dependent’, location quotients were calculated for employment by industry sector for 2006. A location quotient greater than one indicates economic specialisation. Those towns with a location quotient for mining of 2.5 or more were deemed to be heavily dependent on resource extraction and were included in the study. A total of 33 fit our definition of a ‘small’ mining town, all with populations of less than 5,500 people (Figure 6.1).

A suite of statistics describing the basic demographic and economic characteristics of these communities are provided in Table 6.2. For a more detailed description of the settlement pattern, and the demographic and socioeconomic characteristics of the towns see Chapman et al. (2015a). While the study communities exhibit some of the assumed characteristics of mining towns, there are some features that would not be expected. These towns were all highly dependent on mining, with an average location quotient far exceeding the minimum requirement of 2.5. As anticipated, these communities demonstrated significantly higher
proportion of Aboriginal residents than in Western Australia overall. On average, these communities were also ‘remote’ (as classified by ARIA). However, the relatively large standard deviation and higher median relative to the mean indicates a fair amount of variation in this measurement. Contrary to some assumptions, these mining towns consistently exhibited higher unemployment rates than the State average. Furthermore, unemployment rates were closest to the State level prior to the boom. The greatest difference was in the initial stages (2006) of the boom, with only a small improvement in 2011. Similarly, the labour force participation rate in mining towns exceeded that of the State in 2001, but fell below State levels in 2006 and even further in 2011. This gives some evidence that economic conditions in these towns may have worsened over the boom period, particularly in relation to the State.

Figure 6.1: Map depicting the 33 study communities and the predominant minerals extracted at each locality
6.5.2 Testing for Convergence

Testing for convergence suggests that the dynamics of uneven development differ across the phases of the resource boom. In the initial period (2001-2006), there is evidence to suggest convergence across Western Australia’s small mining towns, with smaller communities catching up with larger communities, at least in terms of employment growth (Figure 6.2). Hopetoun is a clear outlier here, largely as a result of the development of a large new nickel project.

However, this dynamic is reversed over the subsequent phase of the resource boom (2006-2011), with divergence occurring across the resource towns; larger towns forged ahead of their smaller counterparts (Figure 6.3). The shift in the geography of uneven development from converging to diverging employment dynamics suggests that the mining boom actually exacerbated problems of inequitable growth, at least amongst small mining towns.

Table 6.2: Select demographic and economic data for the 33 study communities and the Western Australian mean for the corresponding variables (ABS, 2002, 2007, 2011).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>1085.64</td>
<td>957.74</td>
<td>788</td>
<td>1,851,252</td>
</tr>
<tr>
<td>2006</td>
<td>1158.91</td>
<td>1089.90</td>
<td>711</td>
<td>1,964,978</td>
</tr>
<tr>
<td>2011</td>
<td>1312.18</td>
<td>1358.69</td>
<td>762</td>
<td>2,239,170</td>
</tr>
<tr>
<td>Indigenous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>13.28</td>
<td>17.12</td>
<td>4.81</td>
<td>3.16</td>
</tr>
<tr>
<td>2006</td>
<td>12.55</td>
<td>15.76</td>
<td>3.83</td>
<td>2.96</td>
</tr>
<tr>
<td>2011</td>
<td>12.88</td>
<td>15.30</td>
<td>4.61</td>
<td>3.07</td>
</tr>
<tr>
<td>Remoteness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>7.71</td>
<td>4.37</td>
<td>9.13</td>
<td>-</td>
</tr>
<tr>
<td>2006</td>
<td>7.99</td>
<td>4.50</td>
<td>9.15</td>
<td>-</td>
</tr>
<tr>
<td>2011</td>
<td>8.03</td>
<td>4.86</td>
<td>9.00</td>
<td>-</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>7.60</td>
<td>4.44</td>
<td>7.61</td>
<td>7.5</td>
</tr>
<tr>
<td>2006</td>
<td>5.46</td>
<td>4.10</td>
<td>4.50</td>
<td>3.8</td>
</tr>
<tr>
<td>2011</td>
<td>5.42</td>
<td>3.34</td>
<td>5.22</td>
<td>4.7</td>
</tr>
<tr>
<td>Participation Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>64.54</td>
<td>11.49</td>
<td>64.37</td>
<td>62.3</td>
</tr>
<tr>
<td>2006</td>
<td>61.98</td>
<td>10.26</td>
<td>61.83</td>
<td>62.1</td>
</tr>
<tr>
<td>2011</td>
<td>60.72</td>
<td>11.21</td>
<td>59.10</td>
<td>63.9</td>
</tr>
<tr>
<td>LQ Mining</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>26.37</td>
<td>19.32</td>
<td>20.20</td>
<td>3.8</td>
</tr>
<tr>
<td>2006</td>
<td>18.98</td>
<td>14.36</td>
<td>12.97</td>
<td>3.6</td>
</tr>
<tr>
<td>2011</td>
<td>8.70</td>
<td>6.34</td>
<td>6.31</td>
<td>2.3</td>
</tr>
</tbody>
</table>
Figure 6.2: Trend of employment growth across mining towns for 2001-2006, with an average growth across the study towns of 0.0612 and a State average of 0.1295.

Figure 6.3: Trend of employment growth across mining towns for 2006-2011, with an average growth across the study towns of -0.0415 and a State average of 0.1728.
6.5.3 Shift-Share Analysis

The implications of the relative importance of economic structure, as opposed to local competitiveness, in determining local employment growth can be differentiated by the extent to which the two components are complementary or substitutes for each other. Put differently, we can unpack the extent to which economic structure and local competitiveness reinforce each other or act in opposite directions, either enhancing or retarding local employment growth. This relationship is summarised in Figure 6.4.

![Diagram of Industry Mix and Local Competitiveness](image)

**Figure 6.4:** Relationship between industry mix and local competitiveness.

Applying this taxonomy to the dynamics of employment growth at the beginning of the resource boom (2001-2006), it is apparent that there is a diversity of economic structural effects, with some communities experiencing an unfavourable industry mix, while others experience a largely favourable industry mix (Figure 6.5). In contrast, all of the resource communities, with the exception of Ravensthorpe experienced negative local competitiveness effects on their employment growth. That is, over and above the effect of economic structure, the local characteristics of these communities held back their growth. In the case of Ravensthorpe, high local competitiveness may be due to the construction of a new nickel and cobalt mine and processing plant (First Quantum Minerals, 2015).
The relationship between the economic structure and local competitiveness effects changed dramatically as the resource boom unfolded over the 2006 to 2011 period. In contrast to the earlier phase of the resource boom, all towns experienced a favourable industry mix (Figure 6.6). While for some communities the impact of economic structure was now being reinforced by the competitiveness of these localities, there were nonetheless a large number of communities still being held back by local factors.

The correlations between the structural and local factors over the two time periods reveal a strong negative relationship in the period 2001 to 2006 and a less articulated relationship in 2006 to 2011 (Table 6.3). The findings suggest that the economic structure and the impact it has on employment growth has changed over the course of the mining boom, as would be expected, while the local competitiveness largely inhibits growth across both time periods. The net benefit of these two components varies across the study communities and over time (Figure 6.7). In the period 2001 to 2006, the majority of communities experienced growth below the State average, with an overall negative relationship between initial employment levels in the study communities and subsequent growth (Figure 6.2). In the following time period, the net effect of economic structure and local competitiveness was more positive for many communities. A greater number had growth above the State average, and there was a positive relationship between initial employment levels and employment growth (Figure 6.3).

6.5.4 Modelling Local Competitiveness

The results of the shift-share analysis suggest that there is considerable variability in the local competitiveness component across Western Australian mining communities and across the different phases of the resource boom. A general-to-specific model selection strategy was used to derive a final model of local competitiveness (Table 6.4). The least significant of the theoretically informed surrogate variables were individually eliminated from the model, until all variables had an $F$-statistic less than .100. The final models are both statistically significant and congruent with the data, at least as determined by the suite of model mis-specification tests (Table 6.5). That is, the models account for statistically significant proportions of the variability in local competitiveness, accounting for approximately 83% of the variability in 2001 to 2006 ($F=16.65$, $p\leq0.001$) and 87% in 2006-2011 ($F= 20.16$, $p\leq0.001$). Furthermore, the empirical results confirm our conjecture that the impact of local characteristics plays out differently across phases of the mining boom.
Figure 6.5: Relationship between industry mix and local competitiveness, 2001-2006.

Figure 6.6: Relationship between industry mix and local competitiveness, 2006-2011.
Table 6.3: Correlations between the industry mix (IM) and local competitiveness (LC) for 2001-2006 and 2006-2011.

<table>
<thead>
<tr>
<th></th>
<th>2001-2006</th>
<th>2006-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>LC</td>
<td>IM</td>
</tr>
<tr>
<td>2001 - 2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM</td>
<td>1</td>
<td>-0.9807</td>
</tr>
<tr>
<td>LC</td>
<td>-0.9807</td>
<td>1</td>
</tr>
<tr>
<td>2006 - 2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM</td>
<td>-0.2199</td>
<td>0.2033</td>
</tr>
<tr>
<td>LC</td>
<td>0.0908</td>
<td>-0.0592</td>
</tr>
</tbody>
</table>

Figure 6.7: The net employment growth for the study communities, with the employment growth for all of Western Australia indicated by the horizontal lines.
Table 6.4: Final models of the drivers of local competitiveness (2001-2006, 2006-2011).

<table>
<thead>
<tr>
<th>Variable</th>
<th>2001-2006</th>
<th>2006-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td>-2.264</td>
<td>-1.096**</td>
</tr>
<tr>
<td><strong>Local Human Resource Base</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>0.000185</td>
<td>0.0000381</td>
</tr>
<tr>
<td>Population stability (5 years)</td>
<td>-0.0770**</td>
<td></td>
</tr>
<tr>
<td>Mean income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% with tertiary education</td>
<td>-0.0705****</td>
<td></td>
</tr>
<tr>
<td>Participation rate</td>
<td>0.0611**</td>
<td>-0.0116**</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>-0.197***</td>
<td></td>
</tr>
<tr>
<td>Participation rate (female)</td>
<td></td>
<td>0.0184*</td>
</tr>
<tr>
<td>Participation rate (part-time)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% home ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local voter turnout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Indigenous population</td>
<td>-0.0688***</td>
<td>-0.0114**</td>
</tr>
<tr>
<td><strong>Infrastructure Support and Institutional Thickness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% to receive Commonwealth benefits</td>
<td>0.356***</td>
<td>0.0218**</td>
</tr>
<tr>
<td>Federal general purpose funding</td>
<td>0.00160</td>
<td>-0.000472****</td>
</tr>
<tr>
<td><strong>Knowledge Creation and Access to Markets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remoteness</td>
<td></td>
<td>0.0388**</td>
</tr>
<tr>
<td>Price index</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inter-regional Trade and the Nature and Extent of Local Demand</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining to non-mining job ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic diversity</td>
<td></td>
<td>1.024**</td>
</tr>
<tr>
<td><strong>Local Sectoral Specialisation and Power of Large Corporations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-company</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commodity produced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gold</td>
<td>-0.855*</td>
<td>-0.0904</td>
</tr>
<tr>
<td>Mineral Sands</td>
<td></td>
<td>-0.219**</td>
</tr>
<tr>
<td>Bauxite</td>
<td>2.241***</td>
<td></td>
</tr>
</tbody>
</table>

| F-Ratio | 16.65*** | 20.16*** |
| R-sq | 0.883 | 0.913 |
| Adj. R-sq | 0.830 | 0.868 |
| Rmse | 0.699 | 0.0967 |

*p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001
Table 6.5: Mis-specification tests showing that there are no omitted variables (RESET), the residuals are normally distributed (Shapiro-Wilks) and homoscedastic (Chi²), and the model is correctly specified (HatSq).

<table>
<thead>
<tr>
<th></th>
<th>RESET</th>
<th>Shapiro-Wilks</th>
<th>Chi²</th>
<th>HatSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2006</td>
<td>F = 0.2380</td>
<td>z = 0.410</td>
<td>p = 0.341</td>
<td>0.02</td>
</tr>
<tr>
<td>2006-2011</td>
<td>F = 0.6865</td>
<td>z = 0.237</td>
<td>p = 0.594</td>
<td>0.02</td>
</tr>
</tbody>
</table>

The final model specifications indicate that, at least in the context of small resource town in Western Australia, the processes driving local competitiveness are somewhat simpler than those that have been identified in the literature of endogenous growth theory. At the start of the resource boom, of those surrogate measures that were identified as being statistically significant, three are consistent with theoretical expectations while three are non-consistent (and two additional variables remain in the final model, but are not statistically significant). In contrast, in the later phase of the resource boom three measures were identified as statistically significant and consistent with theoretical expectations, while five were significant but did not have the anticipated relationship with local competitiveness (with one variable in the final model, which is not statistically significant). Additionally, the Local Sectoral Specialisation is considered, for which the effect on competitiveness would depend on the specific commodity. Possible explanations for the discrepancies between the findings and endogenous growth theory are discussed in the following section.

6.6 Discussion

The findings of this research suggest that there are quite complex processes shaping uneven development amongst small Western Australian mining towns. The evidence points to growing levels of divergence (uneven development) over the resource boom, and that this was driven mainly by global economic processes (through the industry structure), rather than local competitiveness. This is not to say that local competitiveness is not important, simply that it became less important as global demand (and prices) for commodities increased. In unpacking the elements of competitiveness that are important, the modelling undertaken for this research indicates that a number of the theoretical constructs were significant, though not always in the ways we expected.
One of the most prominent themes within endogenous growth theory is role of the *Local Human Resource Base*. In this analysis, a number of the variables that were used as measures of this set of conceptual constructs were found to be significant in driving competitiveness, but these did not always align with theoretical expectations. Moreover, some variables that were expected to be significant did not remain in the final model. The total population was significant in both periods, suggesting that a larger population may indeed provide a larger pool of labour from which skills and knowledge can be drawn (Glaeser, 2001; Jacobs, 1969). In terms of population stability, the expectation was that this would contribute to bonds of social capital, better sharing of knowledge and a degree of community cohesion, all of which might underpin competitiveness (Glaeser, 2001; Maillat, 1995). The modelling showed that this was not necessarily the case. Indeed, in the period 2001 to 2006 population stability was negatively associated with competitiveness, and it did not appear in the 2006 to 2011 model. There are a number of plausible explanations for this. It is likely that in the dynamic initial period of the mining boom (2001-2006) those places that expanded rapidly did so through the use of labour ‘imported’ from elsewhere. This would be consistent with the findings of Halseth (1999a) and Lucas (1971) in studies of the cyclical nature of employment and population in mining communities. This new labour might also import new knowledge and skills, further increasing local competitiveness (Barro and Sala-i-Martin, 2004; De Groot et al., 2009). By the second phase of the boom, the impact of this appears to have decreased.

One of the most commonly discussed aspects of endogenous growth theory is the role of human capital in driving local competitiveness, which is typically measured through data on educational attainment. In our case study localities this was not the case. Contrary to expectation, in the 2001 to 2006 period education was negatively associated with local competitiveness (Barro, 2000). We would conjecture that this is in part to do with the spatially disaggregated nature of the mining activity, whereby many highly educated workers remain based in cities and only visit sites as required (or on a fly-in/fly-out basis). Those ‘on site’ might typically be less skilled, and involved in occupations that require a lower level of formal education. This variable becomes less relevant as the boom progresses into 2006 to 2011. We would stress that this finding is at best tentative and requires further on-the-ground research. Nevertheless, it does point to a possible key difference between resource towns and others economies when viewed through the lens of endogenous growth theory.
One of the other findings of note in the modelling was in relation to employment variables, notably the participation rate and unemployment. In the initial period, the labour force participation rate positively contributed to local competitiveness, as would be anticipated. However, this relationship changed as the boom progressed. We posit that this could be due to some of the skill and capacity limits of the ‘reserve army of the unemployed’ (Massey, 1991). In the first phase of the boom (2001-2006), it is likely that economic growth was in part linked to the utilisation of people not previously engaged in the labour market, thereby increasing the participation rate. This increased competitiveness by tapping into the skill base within the ‘reserve army’ (Tonts and Davies, 2008). However, as the boom progressed and labour market conditions tightened across the entire State, companies were recruiting increasingly less skilled and sometimes ‘problematic’ workers in order to fill vacancies (Tonts and Davies, 2008). Hence, as the participation rate increased further, this may have had a negative impact on competitiveness in the second phase of the boom (2006-2011). This might also help to explain the role of the female participation rate (Strachan et al., 2002). In mining towns, one of the groups that has been noted as an area of hidden unemployment or underemployment is women. The high rate of vacancies in mining towns during the second phase of the boom saw increasing opportunities for women, which is likely to have increased competitiveness by drawing on an underutilised skill base. Again, further detailed local research is needed to verify this. Consistent with expectations, a high unemployment rate had a negative impact on competitiveness in 2001-2006, but was not in the 2006-2011 model. This may be due to the rapid decrease in unemployment rates over this period across the State, and increasing uniformity in rates across the case study towns. A higher Aboriginal population was associated with lower competitiveness, and this was consistent with expectations. Australia’s remote Aboriginal populations typically experience higher levels of social and economic disadvantage than their non-Aboriginal counterparts in remote Australia (Altman and Biddle, 2011). There have also been ongoing questions about the extent to which mining has contributed to material improvement in conditions for Aboriginal people living in close proximity to extractive industries (Langton and Mazel, 2008).

A number of variables that were expected to be significant in terms of the local human resource base proved not to be significant in the modelling for either time period. These include percentage of home ownership and local voter turnout (McMillan and Chavis, 1986; Putnam, 1993). These indicators were seen to represent commitment to the local community in either material or socio-political terms. In the context of rapid resource-led growth, these
appear to be of little impact. Yet, it may also be the case that more precise measures of social capital and local ‘commitment’ are required here.

The other theoretical constructs also demonstrated ways that mining towns do not perform as the literature on endogenous growth would anticipate. In both time periods, the measures of *Infrastructure Support and Institutional Thickness* were important, though not as expected. Welfare receipts were positively associated with competitiveness, which is contrary to a view that welfare might be directed towards areas that are problematic in economic terms. This may be because Commonwealth benefits contribute expenditures over and above mining that enhance local economic activity. In terms of infrastructure funding, this was important in the first phase of the boom, but was negatively associated with local competitiveness in the second. The reason for this may be that infrastructure development was important during the early phase of mining construction and expansion, but had a diminishing impact over time. It might also suggest that *how much* money was spent is less relevant than *how* it was spent. It is therefore possible that the allocation to particular projects was not optimal.

Of the indicators for *Knowledge Creation and Access to Markets* and *Inter-regional Trade and The Nature and Extent of Local Demand* none were significant in the first time period. In the second period, economic diversity and remoteness were significant. The importance of economic diversity is consistent with expectation and aligns with ideas embedded within endogenous growth theory in that places engaged in multiple sectors might be better placed to drive growth (Glaeser et al., 1992). The significance of competitiveness as having a positive impact on remoteness is surprising. We would have expected places that were highly remote to suffer from problems associated with high labour, transport and other costs. However, it is likely that in remote areas only high quality ore bodies or energy resources that are highly profitable are developed. Companies are then able to overcome costs associated with transport, communications and labour. Moreover, Western Australia’s long history of providing government support in developing resource projects may help to reduce the impact of remoteness (see Horsley, 2013).

The final theoretical construct – *Local Sectoral Specialisation and the Power of Large Corporations* had a number of significant variables. It would appear that competitive forces operating between mining companies in multi-company towns contribute to lower levels of local competitiveness (Glaeser et al., 1992; Miracky, 1995). This may be in part a product
of the history of towns, with a number of the single company towns established in the 1960s and 1970s remaining effective local ‘monopolies’. These towns also had the benefit of considerable company investment in housing, infrastructure, and services prior to the normalisation process of the 1980s which converted these to open towns (Black, 1981; Thomas et al., 2006). It is also apparent that the particular dynamics of individual commodities were important. This was most evident with gold, mineral sands and bauxite, and is likely to be related to the quality of the ore body, the economics of extraction, and the particular business practices related to firms engaged in these sectors.

6.7 Conclusion

Uneven development is increasingly being looked at in terms of competitiveness and endogenous growth. In this study, the question of uneven development and competitiveness are brought together to look at the extent to which local factors contribute to local economic growth in the face of broad structural changes. It provides insights into how the dynamics of extra-local forces and local competitiveness account for uneven development. In addition, it looks at a suite of place-based factors that are informed by the endogenous growth literature. For geographers, there is often a focus on aspects of human capital, local infrastructure and institutions, knowledge creation, trade and market characteristics, sectoral specialisation, and the role of corporations (Plummer and Taylor, 2012). Although the role of some of these concepts in driving competitiveness in mining towns is not wholly articulated in this paper, it is apparent that this is an area in need of further research. The application of endogenous growth literature to booming mining economies demonstrates that this is a unique context not fully addressed in the literature.

Variable levels of competitiveness contribute to uneven amounts of growth through the different ways in which communities capture the effects of the broader economic conditions and the unique interaction of this with local conditions. In Western Australia’s small mining towns the recent resource boom has contributed to the so-called two ‘two-speed economy’, with varying levels of growth between mining and non-mining communities (Martin and Sunley, 1998; Plummer and Tonts, 2013). However, this study revealed that there is uneven growth even between mining towns. Prior to, and in the early stages of, the boom, Western Australia's small mining towns were experiencing convergence in employment growth. This occurred despite almost all communities having local factors that detracted from economic growth. This is consistent with convergence theory, which suggests that the growth rates of
economies will find an ‘equilibrium’ on which to converge, assuming equal access to technology, capital, and labour (Abreu, 2014; Chatterji, 1992). In the latter time period, these towns experienced divergence, with those communities with higher initial growth forging ahead and those with lower levels lagging behind. In this period, with the booming mining sector, structural growth contributed positively to potential economic growth, yet uneven development persisted. In some cases, local factors enhanced a favourable industry mix, but in many communities local factors continued to inhibit growth throughout the mining boom. We suggest that this is due to the nature of economic growth being tied to a fixed, finite asset. Operations that were already undertaking large-scale production or expansion had the capital and capacity to increase output. This divergence across mining towns mirrors the ‘two-speed economy’ that was observed in the broader State economy overall.

Endogenous growth literature often points to the role that local factors play in driving competitiveness and the ability of communities to control their own economic conditions (Bristow, 2010; Kitson et al., 2004; Plummer and Taylor, 2004). However, this study shows that in mining communities structural conditions play a critical role in economic growth. As the boom progressed, fewer local drivers contributed to growth in a way that would be predicted by literature. Over the course of the mining boom, economic structure changed and became increasingly important in driving growth. Local conditions, on the other hand, remained marginal or, indeed, detrimental in promoting growth above and beyond that driven by structural conditions. This points to the importance of global demand, as it shapes prices and investment, levels of production, and local economic growth (Cochrane and Poot, 2014).

None of this is to say that competitiveness does not matter in the context of local resource economies. It does, but perhaps not to the extent that proponents of endogenous growth theory might suggest. Looking at the theoretical constructs commonly identified in endogenous growth theory, only Local Human Resource Base appears to play an important role in driving competitiveness. Most of the variables for the other constructs were not significant or did not perform as would be expected in the literature. However, many of these idiosyncrasies can be explained by the context in which the endogenous growth theory is being applied. For the most part, the global economic conditions overwhelmed the capacity of local conditions to drive competitiveness.
We would suggest that due to their resource dependence, mining communities are particularly susceptible to changes in the global economic structure, as resource sectors are greatly affected by these conditions. Integration of the local economy into broader economic structures exposes the community to global economic processes. This can overwhelm the local capacity to drive growth. While global conditions can facilitate growth in a community that might otherwise not have favourable local conditions, it also exposes local economies to global market vulnerabilities and sees some communities miss out on the growth experienced elsewhere.

The outcomes of this study hold numerous implications for regional analysis and policy. First, it finds that while uneven development persists, it cannot be accounted for purely by local factors. While some local aspects are important, during boom periods they become less so, as structural processes and conditions overwhelm local conditions. Second, it is too simplistic to think of uneven development as occurring only between mining and non-mining towns. This study demonstrates that this is not the case. Even amongst mining towns, there is considerable variation in economic growth due to local factors. Finally, these results raise questions as to the capacity of local policy to grow competitiveness during boom periods. There is a need for multi-scalar and integrated approaches in regional policy to address the complex needs of mining towns. Given the limited extent to which local conditions contributed to growth, policy efforts should focus on broad, macro-economic considerations, such as the regulatory environment, fiscal policy, and investment attraction. This may, in turn, enhance competitiveness at the local level. However, it is also clear that conditions changed across the boom, and that different variables matter at different points in the ‘resource cycle’. It may be that as the boom subsides, local competitiveness becomes increasingly important in ensuring the ongoing economic performance of resource towns. This points to the ongoing need for policy-makers to be adaptive and cognisant of the interplay between wider global competitive forces and local competitiveness.
Chapter 7: Reshaping Rural Communities ‘At a Distance’: The Resource Boom, FIFO and Non-mining Towns

7.1 Prologue

This chapter is forthcoming as a book chapter in *Labour Force Mobility in the Australian Resources Industry: Socio-Economic and Regional Impacts* (edited by Fiona Haslam – McKenzie and published by Springer). It expands the focus beyond mining towns *per se* to consider the experiences of those living in mid-sized regional cities which are not resource-dependent. It utilises Q-methodology for a collective case study of the towns of Albany, Northam, and Geraldton. Although historically these towns had little direct involvement with the mining industry, there has been a recent increase in the number of residents employed in the mining sector. We presume this is due to the access to airports in or near these three places, which allows residents to participate in the fly-in/fly-out (FIFO) labour force. Often, this flow of labour is assumed to connect major metropolitan cities to remote resource towns or extraction sites. However, a growing number of residents in these regional hubs engaged in FIFO work. This, in turn, has social and economic implications. This chapter discusses how FIFO contributes to a growing complexity of spatial interdependencies and identifies the ways in which increasing linkages with mining regions impacts non-mining communities.
7.2 Introduction

Australia’s mining industry has long been interwoven with distinctive geographies of settlement and labour. In the nineteenth and early twentieth centuries, ephemeral mining camps and towns sprung up close to resource discoveries. In some cases, these evolved into iconic towns like Kalgoorlie and Broken Hill, with large populations and a comprehensive set of service industries. The mode of settlement began to change in the 1960s and 1970s, with new large-scale resource projects led by multinational firms accompanied by the construction of entire towns to ensure an adequate supply of labour (Brealey et al., 1988). These ‘company towns’ offered workers high quality housing, social services, and community amenities as part of a deliberate strategy to attract and retain workers and their families in remote areas (Stickells, 2014). The common thread here was that workers would live, either on a permanent or semi-permanent basis, close to the mining activity. In many respects, this represents a fairly traditional view of spatial labour markets in that work is in close proximity to home.

The 1980s, however, began to see these spatial labour markets change radically with the emergence of long-distance commuting (Houghton, 1993). Permanent settlement was eschewed in favour of the ‘mass transit’ of workers, usually by air transport, from their homes in large metropolitan areas to remote work sites. Rather than live in traditional towns, workers live in mining camps over the course of rostered work blocks (e.g. 14 days on site with 7 days break) (McKenzie et al., 2014). The emergence of these fly-in/fly-out workforce practices now challenge conventional notions of settlement systems and hierarchies, regional economic development, and the dynamics of spatial labour markets (Haslam-McKenzie, 2011; Storey, 2001, 2010).

The past decade or so has seen increasing disquiet about the impact of FIFO work practices on remote regions and towns. This includes concerns about the loss of permanent employment and investment from regions, the demise of social and cultural institutions, and rising levels of social dislocation (e.g. Cameron et al., 2014; Langton, 2010; Rolfe, 2013; Rolfe and Kinnear, 2013; Scott et al. 2012). In addition, concerns have been raised about the impacts of FIFO on the mental health and welfare of workers, and on traditional family structures (e.g. Taylor and Simmonds, 2009; Torkington et al., 2011). Many of these issues were captured in a Commonwealth Government’s (2013) inquiry into FIFO and similar workforce practices in Australia. The evocative title of the report, Cancer of the Bush or Salvation of the Cities?, offers some insight into the discourse associated with FIFO; that is,
the practice has deleterious impacts on rural areas, with the majority of the benefits accruing in Australia’s capital cities.

There is, however, a small but growing body of work that points to more complex spatial arrangements with regards to FIFO. A recent paper by McKenzie et al. (2014) for example, shows that many FIFO workers come from regional communities and that there may be significant benefits that flow to these places (see also Haslam-McKenzie and Hoath, 2014). These benefits are not simply the wages derived from mining jobs and associated local spending, and economic multipliers, but also include a range of social benefits. These can include living close to existing networks of friends and family, remaining engaged in local social institutions, and having increased employment flexibility. In rural economies that have experienced restructuring, and in some cases economic and population decline (Tonts, 2000), the income derived from mining and the ability to retain population may well be critical to their long-term sustainability. There is, of course, a counter argument that FIFO has the potential to drain these regional centres of both skilled and unskilled labour, and that the roster system may weaken social institutions.

While relatively little research has been done on the extent or impacts of FIFO in non-mining rural communities, it is clear that it has the potential to alter traditional patterns of regional economic and social development. For example, the mining company Rio Tinto has claimed that as much as 33 per cent of their FIFO workforce in the Pilbara region comes from regional Western Australia (McKenzie et al., 2014), and a Commonwealth Government report indicates that an increasing number of regional communities are actively pursuing the opportunity to serve as FIFO hubs (Commonwealth of Australia, 2013).

In a conceptual sense, the outcome is a more complex set of spatial linkages and interdependencies between local economies within Australia. Although traditional staples-led accounts of regional growth tend to emphasise a flow of benefits from regional ‘periphery’ to metropolitan ‘core’, the emergence of FIFO linkages to non-mining rural communities point to a subtle shift. It may have once been the case that rural communities benefited from a small number of people migrating to mining regions and transferring what, in effect, were remittances back to their home communities. However, the linkages now created under FIFO are more direct and dynamic. Moreover, spatial labour markets can no longer be conceived as being either (a) ‘containers’ with workers living close to where they work or (b) binary flows of FIFO workers between metropolitan areas and minesites.
This chapter builds on the handful of studies that have considered the alternative regional linkages between mining regions and non-mining communities. It utilises a Q-sort technique and qualitative interview material to assess local perceptions on the positive and negative impacts of FIFO in three Western Australian communities that have traditionally had little or no direct involvement in mining: Albany, on the south coast; Northam in the Wheatbelt region; and Geraldton, in the State’s Mid West Region. The next section offers a description of the regional context, before providing an overview of the research methods. The chapter then gives a summary of the findings from research conducted in the communities, and concludes with a discussion about the wider implications, particularly in terms of regional policy.

7.3 Regional Context

The recent rapid expansion of resource extraction in Western Australia has seen a dramatic increase in the number of workers flying in and out of its remote mining regions (Commonwealth of Australia, 2013). The most notable of these are the Pilbara region in the northwest, where the majority of the State’s iron ore reserves are located, and the Goldfields-Esperance region, which has a large number of gold and nickel mines. While traditionally the workers involved in FIFO in these regions were from the Perth metropolitan region, a more diverse set of source communities are now linked to mining through these long-distance commuting arrangements. For example, Haslam-McKenzie and Hoath (2014) noted that the coastal town of Busselton is now an important source community, and our discussions with regional development practitioners identified Albany, Geraldton, and Northam as other towns with a FIFO workforce (Figure 7.1). These towns have little or no history of being actively involved in mining. Albany, with a population of 34,873 (ABS, 2012), is an important regional service centre for the surrounding agricultural communities, and an important port and tourist centre. Northam is an agricultural service centre of 10,830 people (ABS, 2012) that has traditionally supported the mixed crop and livestock industries in the central and western parts of the State’s grain belt. Geraldton is also a major regional service centre and port, with a population of 38,340 (ABS, 2012). It supports the surrounding agricultural region, as well as a vibrant fishing industry (Plate 7.1). Of the three towns it has the closest association with mining, with mineral sands and some iron ore extraction occurring in the region.
Figure 7.1: Map of Western Australian regional hubs (Murphy, 2015).
One of the challenges of undertaking research on FIFO is that there are no reliable data sources on the number of people engaged in the practice (Commonwealth of Australia, 2013). To estimate the number of FIFO workers in the study communities, we used Census data to compare the ‘working population’ profile to the ‘place of usual residence’. The working population profile reports the number of people in a given industry in the place where they work, while the place of usual residence data show the number of people in an industry in the place where they live. A greater number of people employed in mining who live in a particular locality than the number of people employed in mining who work in that locality gives an indication of the workforce engaged elsewhere. A similar approach was used recently by KPMG (2013) in their assessment of the extent of the FIFO workforce in Australia. While this is a crude measure, it provides at least some indication of people living in the three case study towns and working elsewhere. Our underlying assumption is that, given that there is relatively little mining occurring in or near these towns, FIFO will account for a sizeable number of absentee workers.

All the study towns experienced a relatively large increase in the number of people who work in mining and, to a lesser extent, construction, based on place of usual residence, from 2001 to 2011 (Table 7.1). In contrast, the number of people reported as working in these
industries in each town is significantly lower than amongst the usual resident populations, and recorded negligible increases over the same time period. This suggests both that the number of people involved in mining has increased, and that the work is undertaken outside of the local area. Based on these data and local knowledge, we would suggest that a significant proportion of the workers are engaged in FIFO, or in the case of Geraldton, some drive-in/drive-out work to mines in nearby areas (Table 7.2). Furthermore, mining demonstrated high growth rates (based on place of usual residence) during periods of marginal overall employment growth. This perhaps suggests that mining can play a role in contributing to local economic growth within these communities, even though the workers are engaged in this industry elsewhere (Table 7.3). In summary, the number of residents employed in mining outside their ‘home’ community increased from 40 to 243 in Albany, 379 to 868 in Geraldton, and 30 to 161 in Northam between 2001 and 201

Table 7.1: Number of people employed in select industries, by place of usual residence and place of work, 2001-2011 (ABS, 2002, 2012).

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<tbody>
<tr>
<td><strong>Agriculture</strong></td>
<td></td>
<td>1067</td>
<td>957</td>
<td>842</td>
<td>532</td>
<td>294</td>
<td>249</td>
<td>36674</td>
<td>26383</td>
</tr>
<tr>
<td><strong>Mining</strong></td>
<td></td>
<td>40</td>
<td>243</td>
<td>379</td>
<td>868</td>
<td>30</td>
<td>161</td>
<td>28771</td>
<td>67941</td>
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<tr>
<td><strong>Manufacturing</strong></td>
<td></td>
<td>891</td>
<td>1057</td>
<td>782</td>
<td>868</td>
<td>299</td>
<td>403</td>
<td>84281</td>
<td>90391</td>
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<tr>
<td><strong>Construction</strong></td>
<td></td>
<td>1061</td>
<td>1498</td>
<td>980</td>
<td>1919</td>
<td>346</td>
<td>366</td>
<td>61961</td>
<td>111845</td>
</tr>
<tr>
<td><strong>Retail</strong></td>
<td></td>
<td>2110</td>
<td>2017</td>
<td>2290</td>
<td>2074</td>
<td>631</td>
<td>452</td>
<td>123049</td>
<td>110719</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td>6892</td>
<td>9255</td>
<td>7196</td>
<td>10652</td>
<td>2234</td>
<td>2833</td>
<td>494045</td>
<td>690604</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>12061</td>
<td>15027</td>
<td>12469</td>
<td>16913</td>
<td>3834</td>
<td>4464</td>
<td>828781</td>
<td>1097883</td>
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<tbody>
<tr>
<td><strong>Agriculture</strong></td>
<td>851</td>
<td>697</td>
<td>612</td>
<td>335</td>
<td>214</td>
<td>228</td>
<td>35393</td>
<td>26140</td>
</tr>
<tr>
<td><strong>Mining</strong></td>
<td>29</td>
<td>41</td>
<td>288</td>
<td>304</td>
<td>3</td>
<td>11</td>
<td>28183</td>
<td>69884</td>
</tr>
<tr>
<td><strong>Manufacturing</strong></td>
<td>753</td>
<td>696</td>
<td>737</td>
<td>724</td>
<td>233</td>
<td>271</td>
<td>82190</td>
<td>89662</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>818</td>
<td>953</td>
<td>743</td>
<td>1279</td>
<td>288</td>
<td>256</td>
<td>59541</td>
<td>112675</td>
</tr>
<tr>
<td><strong>Retail</strong></td>
<td>2111</td>
<td>1886</td>
<td>2256</td>
<td>1898</td>
<td>630</td>
<td>455</td>
<td>37202</td>
<td>109699</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>6500</td>
<td>8374</td>
<td>6732</td>
<td>9395</td>
<td>2298</td>
<td>2761</td>
<td>557489</td>
<td>676321</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11062</td>
<td>12647</td>
<td>11368</td>
<td>13935</td>
<td>3666</td>
<td>3982</td>
<td>799998</td>
<td>1084381</td>
</tr>
</tbody>
</table>
Table 7.2: Estimated percentage of FIFO workers in each industry by town, 2001-2011 (Negative numbers indicate that workers come from elsewhere into that locality to work) (ABS, 2002, 2012).

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>20.24</td>
<td>27.17</td>
<td>27.32</td>
<td>37.03</td>
<td>27.21</td>
<td>8.43</td>
<td>3.49</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>Mining</strong></td>
<td><strong>27.50</strong></td>
<td><strong>83.13</strong></td>
<td><strong>24.01</strong></td>
<td><strong>64.98</strong></td>
<td><strong>90.00</strong></td>
<td><strong>93.17</strong></td>
<td><strong>2.04</strong></td>
<td><strong>-2.86</strong></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>15.49</td>
<td>34.15</td>
<td>5.75</td>
<td>16.59</td>
<td>22.07</td>
<td>32.75</td>
<td>2.48</td>
<td>0.81</td>
</tr>
<tr>
<td>Construction</td>
<td>22.90</td>
<td>36.38</td>
<td>24.18</td>
<td>33.35</td>
<td>16.76</td>
<td>30.05</td>
<td>3.91</td>
<td>-0.74</td>
</tr>
<tr>
<td>Retail</td>
<td>-0.05</td>
<td>6.49</td>
<td>1.48</td>
<td>8.49</td>
<td>0.16</td>
<td>-0.66</td>
<td>69.77</td>
<td>0.92</td>
</tr>
<tr>
<td>Other</td>
<td>5.69</td>
<td>9.52</td>
<td>6.45</td>
<td>11.80</td>
<td>-2.86</td>
<td>2.54</td>
<td>-12.84</td>
<td>2.07</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8.28</strong></td>
<td><strong>15.84</strong></td>
<td><strong>8.83</strong></td>
<td><strong>17.61</strong></td>
<td><strong>4.38</strong></td>
<td><strong>10.80</strong></td>
<td><strong>3.47</strong></td>
<td><strong>1.23</strong></td>
</tr>
</tbody>
</table>

One of the issues often discussed in the literature on the impact of FIFO operations on regional communities relates to personal income- specifically, the higher salaries earned by those in the resource sector relative to other sectors (e.g. Rolfe and Kinnear, 2013). Higher salaries in mining towns can have the effect of creating inequalities between those in the resource sector, and those in other sectors that pay lower wages (Lawrie et al., 2011). On the other hand, in the case of FIFO into rural communities, it has the potential to provide a valuable injection of income over and above that earned in other sectors, which is often lower than the State and national averages. Table 7.4 confirms that in the three case study localities, labourers involved in mining and construction do tend to earn higher than average...
wages, particularly when compared to labourers in other industries. Moreover, average annual incomes in all towns are lower than the Australian average, and are bolstered by mining. However, given that the absolute numbers involved are small, issues of local inequality and price inflation evident in some mining dominated regions are likely to be relatively minor. In overall terms, then, one would expect to find that the engagement of local workers in FIFO is likely to be regarded within the study communities as benefitting local economies, providing jobs, increasing expenditure, and acting as economic multipliers.

While the growing income derived from mining in other regions is likely to be an increasingly valuable component of the local economy, what is far less evident is how these workforce practices are perceived by stakeholders in economic, social, and policy terms. Accordingly, this paper turns to fieldwork conducted in each of the case study towns in an effort to better understand local perceptions about the impact of FIFO.

<table>
<thead>
<tr>
<th>Data for 2011</th>
<th>Average Income (all industries)</th>
<th>Construction/ Mining Labourers</th>
<th>All Other Labourers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany</td>
<td>$43 023</td>
<td>$49 374</td>
<td>$29 623</td>
</tr>
<tr>
<td>Geraldton</td>
<td>$51 421</td>
<td>$59 451</td>
<td>$37 270</td>
</tr>
<tr>
<td>Northam</td>
<td>$49 975</td>
<td>$67 137</td>
<td>$33 227</td>
</tr>
<tr>
<td>Australia</td>
<td>$57 366</td>
<td>$68 498</td>
<td>$32 398</td>
</tr>
</tbody>
</table>

### 7.4 Research Methods

The Q-sort method was selected as the primary data collection and analytical technique for this study because it utilises both qualitative and quantitative data to detect general perspectives on how the mining industry is perceived to be impacting on these FIFO source communities. Q-methodology was developed in psychology in the 1930s, but has been used increasingly in other fields since the 1980s. It applies a systematic means of capturing subjective views of participants and then interpreting these through a quantitative framework. It aims to enable researchers to identify dominant sets of perspectives and beliefs shared by participants. The general approach will be explained in four basic steps.
More specific information on the technicalities and implementation of the method can be found in Block (1961), Brown (1980; 1993), Dziopa and Ahern (2011), Previte et al. (2007), Stephenson (1953), and Watts and Stenner (2005). In this study, Q-sort also provided the basis for semi-structured interviews, encouraging participants to expand on points and add their own perspectives, which allowed for more in-depth interpretation of the data.

### 7.4.1 Developing the Q-sort

Developing the Q-sort involved an initial review of issues related to FIFO, both positive and negative, in order to capture a diversity of views. A wide range of potential impacts was derived from interviews, newspaper articles, letters to the editor and comments on online articles. These statements also reflected themes that have been discussed in the academic literature on the impacts of FIFO in mining and other communities. The key themes that were covered included the social and economic impacts of FIFO, equality of benefits, government responses, and long-term planning. For each broad issue within these themes (e.g. impacts on employment), between two and four subjective statements were developed. There were a total of 43 statements (listed in Table 7.5).

### 7.4.2 Selecting Participants

The focus of Q-sort data collection is on capturing a range of opinions, rather than a large number of participants. There is little consensus on the ideal sample size used in Q-sort studies. Watts and Stenner (2005) recommend using a ratio of one participant for every statement in the Q-sort, although studies have used ratios ranging from 3:1 (Weber et al., 2008) to 1:2.75 (De Mol and Buyssse, 2008). In this study, an effort was made to secure a ratio of 1:1 as suggested by Watts and Stenner (2005), with participants drawn from government agencies, non-government organisations, community groups, and long-term residents (Table 7.5). A purposive sampling approach was used, with participants invited on the basis of their local knowledge of economic and social issues, involvement in policy and planning issues, and levels of civic engagement. The perspectives of long-term residents who were not involved in economic or community development were also included, in an attempt to acquire a breadth of opinions. There was a total of 17 participants from Albany, 21 from Geraldton, and 8 from Northam, for a total of 46 participants responding to 43 statements.
7.4.3 Administering the Q-sort

In the initial round of data collection, the Q-sorts were administered through face-to-face meetings with participants. Once the aims and methodology were explained, participants were asked to complete a questionnaire to elicit basic demographic and socioeconomic information. They then ranked the extent to which they agreed or disagreed with each of the 43 statements, which were written individually on cards. The statements were placed in a structured template (Figure 7.2), ranging from ‘Completely Disagree’ (-6) to ‘Neutral/Don’t Know’ (0) to ‘Completely Agree’ (+6). Each box could contain only one statement, allowing for the few statements that the respondent felt most strongly about to be placed towards the extreme ends of the template. After the initial round of data collection, the survey transferred to an online format and participants who could not be interviewed face-to-face were requested to complete the Q-sort. A total of 32 completed the Q-sort face-to-face, while 14 completed the online version.

![Figure 7.2: Template of the distribution of Q-sort responses.](image)

**Step 4: Analysis**

All individual responses were recorded and each statement was given the ‘score’ from the column to which it was assigned by the respondent. Using principal component analysis (PCA), common patterns across responses were identified. Each of these patterns is a
‘component’ and the components that explain the greatest amount of variance in the data were used for interpretation. Identifying the point of change in inclination of a scree plot suggested that four components should be used for interpretation.

It should be noted that in the face-to-face Q-sorts, participants were encouraged to expand on statements or comment on elements and impacts not covered by the range of statements. Alternatively, they were offered the opportunity to talk more broadly about changes in their community and wider policy and planning issues. These discussions were treated as semi-structured interviews, and the findings recorded in a series of field notes. Participants who completed the survey online also had the opportunity to write comments on how they felt their community was being impacted. However, this was at the end of the exercise and, therefore, yielded less feedback on the individual statements. Key themes from these qualitative data were identified and are reported here to supplement the results of the Q-sort analysis.

7.5 Empirical Results

7.5.1 Component Identification

The four components derived from the PCA analysis on the Q-sort data represent a set of patterns of responses across the participants. The 43 statements and the significance they hold for each component are listed in Table 7.6. Statements with a significance greater than +.300 or -.300 were considered for interpretation, which is consistent with other studies (e.g. Brown, 1980; Watts and Stenner, 2005). A positive score means that the viewpoint tends to ‘agree’ with that statement, while a negative score demonstrates ‘disagreement’. Almost all statements were significant in at least one of the four components, which suggests there are a broad range of issues of concern to the participants in the study. Overall, the four components (or sets of perspectives) explain a total of 36.38% of the variance in responses. The first relates to the benefits the community receives, specifically addressing how mining activity has influenced community planning and the local economy. It explains 14.65% of the variance. The second perspective deals with governmental responses to FIFO and regional communities. It covers the long-term needs of the communities and the various economic impacts they are currently experiencing, and explains 8.07% of the variance. The third viewpoint is more reserved in its praise of the impacts of mining. It sees positive economic impacts in communities, but identifies
Table 7.6: The issue being examined, Q-sort statements, and scores of each statement for each component.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FIFO is often a scapegoat for common social and household problems.</td>
<td>-0.115</td>
</tr>
<tr>
<td>2. FIFO is necessary for new large-scale resource projects to succeed.</td>
<td>0.327</td>
</tr>
<tr>
<td>3. FIFO workers are detrimental to our sense of community.</td>
<td>-0.242</td>
</tr>
<tr>
<td>4. A dramatic increase the number of FIFO workers living here makes the community less safe.</td>
<td>-0.291</td>
</tr>
<tr>
<td>5. Local businesses are benefitting from an increase in FIFO residents.</td>
<td>-0.007</td>
</tr>
<tr>
<td>6. There has been a noticeable increase in the number of FIFO workers living here.</td>
<td>0.187</td>
</tr>
<tr>
<td>7. There are not enough workers to fill available jobs around town.</td>
<td>0.051</td>
</tr>
<tr>
<td>8. Many decisions regarding community development are made without consulting residents.</td>
<td>-0.084</td>
</tr>
<tr>
<td>9. Local residents have the best knowledge about community needs.</td>
<td>-0.132</td>
</tr>
<tr>
<td>10. All local residents have the opportunity to voice their opinions about new industrial projects.</td>
<td>0.118</td>
</tr>
<tr>
<td>11. The mining boom contributed to a noticeable improvement in local infrastructure and service provision.</td>
<td>0.562</td>
</tr>
<tr>
<td>12. Growth of the resource sector in WA has increased local education, training and employment opportunities.</td>
<td>0.615</td>
</tr>
<tr>
<td>13. Western Australia’s mining and petroleum industries do not affect this community.</td>
<td>-0.638</td>
</tr>
<tr>
<td>14. Neighbouring communities provide the goods, services and amenities unavailable here.</td>
<td>-0.064</td>
</tr>
<tr>
<td>15. There is an adequate level of services and amenities in the community.</td>
<td>0.094</td>
</tr>
<tr>
<td>16. Newly available education, training and certification opportunities are not relevant to this community.</td>
<td>-0.112</td>
</tr>
<tr>
<td>17. It is difficult to attract professionals or public sector workers to live in the community.</td>
<td>-0.349</td>
</tr>
<tr>
<td>18. There is an increasing divide between the incomes earned in the resources sector and those in other sectors.</td>
<td>-0.324</td>
</tr>
<tr>
<td>19. Wages have kept pace with the changing cost of living in the community.</td>
<td>0.246</td>
</tr>
<tr>
<td>20. There has been an increase in the cost of groceries and other goods.</td>
<td>-0.567</td>
</tr>
<tr>
<td>21. Housing and rent prices do not affect local economic diversification.</td>
<td>-0.153</td>
</tr>
<tr>
<td>22. The resource industry is driving up the cost of housing in this community.</td>
<td>0.034</td>
</tr>
<tr>
<td>23. Accessible housing is a key issue in attracting and retaining workers to the community.</td>
<td>0.056</td>
</tr>
<tr>
<td>24. Businesses have been leaving the community because of increased operating costs.</td>
<td>-0.481</td>
</tr>
<tr>
<td>25. It is difficult for local businesses to retain employees due to high wages in the resource sector.</td>
<td>0.082</td>
</tr>
<tr>
<td>26. The Commonwealth Government is responsive to the development issues facing this community.</td>
<td>-0.175</td>
</tr>
<tr>
<td>27. The State Government is responsive to the development issues facing this community.</td>
<td>0.182</td>
</tr>
<tr>
<td>28. Local government is able to respond to community needs associated with WA’s changing economy.</td>
<td>-0.124</td>
</tr>
<tr>
<td>29. Government support and investment for non-resource related industries is evident in this community.</td>
<td>0.460</td>
</tr>
<tr>
<td>30. The Royalties for Regions scheme has had a positive impact on this community.</td>
<td>0.102</td>
</tr>
<tr>
<td>31. Adequate amounts of government revenue are being invested in this community.</td>
<td>0.217</td>
</tr>
<tr>
<td>32. Providing jobs is more important than environmental sustainability.</td>
<td>-0.229</td>
</tr>
<tr>
<td>33. Preserving the environment is important for community sustainability and economic diversification.</td>
<td>-0.181</td>
</tr>
<tr>
<td>34. Current levels of investments in local infrastructure and services will lead to detrimental costs in the future.</td>
<td>-0.301</td>
</tr>
<tr>
<td>35. This community lacks a long-term plan to address its growth and development needs.</td>
<td>-0.347</td>
</tr>
<tr>
<td>36. WA’s mining boom has triggered long-term planning for infrastructure and services provision in this community.</td>
<td>0.572</td>
</tr>
<tr>
<td>37. There has been a notable increase in economic activity within the community.</td>
<td>0.684</td>
</tr>
<tr>
<td>38. Our community should be diversifying their economy.</td>
<td>-0.320</td>
</tr>
<tr>
<td>39. The resource sector provides enough long-term jobs that regional areas don’t need to diversify.</td>
<td>-0.083</td>
</tr>
<tr>
<td>40. Large-scale resource projects provide economic benefits that are spread amongst all regional communities.</td>
<td>0.417</td>
</tr>
<tr>
<td>41. Extractive industries are a good strategy to drive economic growth throughout the State.</td>
<td>-0.142</td>
</tr>
<tr>
<td>42. The resource boom in Western Australia is positively affecting local economic activity.</td>
<td>0.604</td>
</tr>
<tr>
<td>43. Benefits from mining and oil/gas industries are only experienced by the communities where it takes place.</td>
<td>-0.051</td>
</tr>
</tbody>
</table>
potential shortfalls in the long-term regarding economic diversification, and the maintenance of infrastructure. This view explains 7.44% of the variance. The final point of view reveals a sense of ambivalence and slight discontent amongst residents towards the interaction with the mining industry. It recognises a number of benefits for all regional areas, but expresses the view that the specific cities studied are not receiving a fair share of the benefits. While this view is deemed significant, it explains the least amount of variance of the four, at 6.21%.

**Component 1: Community Benefits**

The predominant perspective within these Western Australian regional towns was that adequate planning has taken place to ensure that benefits of the State’s mining boom are geographically dispersed, with FIFO serving as a crucial link in bringing those benefits to the local community. Planning bodies were seen to be actively engaged in ensuring community needs are met (statements 35, 36), both immediately and in the long-term (statement 34). This is important, as a slow or lack of response to rapid changes in mining towns has been found to adversely impact the quality of life of residents, which has the potential to contribute to negative views about mining or lead to opposition to further resource development (Brown et al., 1989; Chapman et al., 2014; Smith et al., 2001). While some residents believed “there are benefits if the operations are well planned and managed,” others were more resigned, with the attitude that “you’re going to get more mines anyway, so you may as well support that and do it in a managed way.”

Some of the benefits that were perceived to be associated with FIFO were: increased economic activity (statement 37); improved infrastructure and services (statement 11); and growing educational opportunities (statement 12). There was not a particularly strong view within this component that the communities need to diversify their local economies (statement 38), which is perhaps not surprising given that these were already relatively diverse regional centres. Unlike mining regions, the industry was not seen as contributing to an increased cost of operating a business (statement 24) or the cost of housing (statement 20) within this particular component. Indeed, a government representative in Northam said that local government “loves” FIFO workers because they seek out affordable houses in the area and continue to live there, even after they no longer work in the resource industry. He saw this as contributing to the sustainability of the town.
One of the striking aspects of this particular component is the extent to which it captures the geographical complexity and spatial linkages associated with the mining industry. There was recognition that while the mining activity was concentrated predominantly in the Pilbara and Goldfields-Esperance regions, the benefits were widely dispersed and included other regional centres. This was particularly evident in statements 13, 18, and 40, which emphasised the geographic concentration and/or dispersal of benefits. While there is often a traditional view that either mining towns or the capital cities benefit from resource extraction, this component indicated that people living in these non-mining regions felt they were also capturing benefits. Moreover, and despite some negative portrayals of FIFO within the State, in the context of this component long-distance was seen as necessary for large projects to succeed (statement 2), and as playing an essential role in transferring the benefits from these regions to the case study localities.

In addition to economic benefits, FIFO was seen as providing potential social benefits to various parts of the local communities. Within this component there was a view that the communities had numerous ‘lifestyle’ benefits and, as such, were desirable places for people to work (statement 17). Building on this in the context of FIFO, a resident of Albany stated that an expansion of this work practice might be beneficial in transforming the population structure and attracting younger residents in the 19 to 45 year age bracket who might like the amenity environment the town has to offer, while benefiting from employment in mining elsewhere. Indeed, the view expressed was that “FIFO can broaden the work and earning opportunities while the family can remain in their preferred environment.” Multiple respondents felt that being a FIFO family in a regional hub was more advantageous than being in Perth, as “there is more of a network of support.” It was believed that being in the outlying suburbs of Perth or being in a small remote town would be isolating and difficult for young FIFO families. This perspective challenged the idea that FIFO is the root of serious negative social and economic impacts on communities, and constructed mining and FIFO as beneficial in overall terms.

Component 2: Government Response

The second component drew out a set of themes related to how government has responded to aspects of mining, FIFO and regional development. The State and, to a lesser extent, Commonwealth governments are arguably in a position to help ensure that benefits from the mining industry are experienced by residents across the State. In overall terms the views expressed in this component were positive about how government has responded
(statements 26, 27, 28), and is perhaps why linking with the resource sector was perceived as an effective strategy to drive economic growth in the case study communities (statements 42, 43). While government agencies were perceived as having consulted with residents (statement 8) regarding FIFO and the community’s changing needs, there was a degree of confidence that agencies understand local needs (statement 9). It was noted in some of the qualitative responses that local government was particularly important, and was “best placed to deal with changes in the community.” However, several residents raised concern that this tier of government did not have the financial resources necessary to deal with the scale of changes occurring as a result of mining. Despite this, within the Q-sort analysis, there was a view that the strategic planning that has taken place did indeed address the long-term needs of the case study communities (statements 34, 35), and that an adequate amount had been invested into local infrastructure, services and economy (statement 31), including non-resource sectors (statement 29).

This favourable view of government response could have been in large part due to the Royalties for Regions scheme, which was perceived as having a positive impact on the community (statement 30). Royalties for Regions was implemented by the State Government in 2008 and aims to return 25 per cent of all royalty income earned from mining to non-metropolitan areas (see Tonts et al., 2013). The policy was initiated in large part to deal with spatial inequalities evident in service provision and infrastructure development within Western Australia, and has resulted in billions of dollars of new investment in regional centres like Albany, Geraldton, and Northam. For one respondent from Geraldton, “Royalties for Regions is one of the most outstanding programs in the government. It’s about time that the regions got something back.” Of course, in addition to the flows of investment associated with Royalties for Regions, these communities also have increased local wage income as a result of their FIFO linkages with the mining industry (statement 6). Unlike the ‘fly-over’ towns, which are bypassed by FIFO workers (Storey, 2001) and ‘host’ communities which report a range of negative social and economic impacts (Lawrie et al., 2011), this component captured a view that mining contributed in a positive way to the local economy (statement 5) and did not negatively impact the sense of community (statement 3).

Component 3: A Cautious Perspective

The third component drew out a more cautious set of perspectives from the Q-sort participants. It recognised that the mining industry provides immediate economic benefits,
but acknowledged that a heavy reliance on the sector might hinder the community in the future. This is an important consideration when planning for the long-term economic and social sustainability of regional towns. The component pointed to an appropriate level of investment occurring in the community, particularly as a result of Royalties for Regions (statement 30). However, unlike component 2, this component saw Royalties for Regions as beneficial but within a context of some caution, as current levels of investment may be detrimental in the future (statement 34). For example, one State Government representative stated that Royalties for Regions was beneficial in that it provided initial capital for new projects, which used to be hard to come by, but that maintenance and operating costs of large public projects might be detrimental to local governments in the long-term. There have indeed been cases in Western Australia where Royalties for Regions has funded some large-scale facilities which are now operating at a loss and depend on further government subsidies to remain open (Shire of Narrogin, 2014).

In overall terms though, this component was suggestive of views that the mining industry has contributed to an increase in local infrastructure and services to a satisfactory level (statements 11, 15). The investment that has gone into the towns was not believed to be driving up the cost of living (statement 22), nor of running a business (statement 24). It was also not felt that increases in wages of resource sector workers has outpaced those in other sectors (statement 18) or that businesses have had trouble keeping employees because of higher wages in the resource sectors (statement 25).

Retaining employees across a range of local economic sectors was viewed as important in sustaining economic diversity and in contributing to resilience, particularly should the resource sector stagnate or contract. Indeed, although increasing interaction with the mining sector did not emerge as detrimental to the local economy, the views captured by this component indicated that there was a reluctance to become excessively dependent on the industry to sustain their local economy (statement 39). The need for economic diversification was not only in relation to the mining industry. One participant in Albany noted that “everyone is hanging their hat on tourism, but as air travel gets more expensive, we need something else.” While one sector may be profitable in the short term, there was a view that these towns needed to ensure that this does not eclipse the need for economic diversity.
**Component 4: Ambivalence and Discontent**

The fourth component that emerged from the analysis revealed a sense of ambivalence and discontent regarding the benefits experienced in FIFO source communities. However, it should be noted that this component was somewhat marginal, explaining only 6.2 per cent of the variance in the Principle Components Analysis. Within this component, resource projects were seen as benefiting all regional communities (statement 40), and that regional hubs were being consulted regarding decisions within the community (statements 8, 10). However, it was felt that the government was not investing enough in “this” community (statement 31). One respondent pointed out that some people expect the same amount of investment to go into these regional hubs as some remote single-commodity resource town. However, many of these hubs do not need the same level of investment to ensure adequate levels of service and amenity. A business owner from Albany stated that “all the ingredients are here, the government just needs to incentivise people to come here.” To some degree this complements the findings of Mackenzie et al. (2014), who found that there was an inflated expectation about the amount of money that FIFO workers could spend in their home town. Within this component, there may be a similar inflated expectation of government spending and investment.

Despite the perceived lack of investment, the component captured a sentiment that suggests the communities have long-term plans in place to meet their future needs (statement 35). This, however, was not necessarily all positive, as respondents also noted that while there was considerable planning occurring, few of these plans ever get implemented. This could be due to competing priorities, government agency structure, project complexity and remoteness, all of which slow the implementation of new plans and initiatives (Chapman et al., 2014). Ensuring that residents are informed of the planning process and the status of upcoming projects could mitigate this sentiment, as there would likely be improved understanding of the process, even if there is little in the way of a ‘physical product’. At the same time, having a transparent process would place pressure on governing bodies to ensure that these plans are, in fact, progressing and being implemented in an efficient manner.

While there were mixed views on the planning and governance ramifications associated with interaction with the mining industry within this component, there were positive views on some social and economic impacts FIFO. In general, FIFO was not seen as contributing to social problems (statement 1), which may indicate that it is becoming widely accepted as a workforce ‘norm’. It also has brought economic benefits to communities that highly value
jobs (statement 32), without adversely affecting cost of living and economic diversity (statement 21). This perspective recognised that interacting with the mining industry could potentially bring benefits to the community, but that aspects of governance may hinder the full realisation of those benefits.

7.6 Discussion and Implications

The perspectives of local stakeholders about the impact of FIFO workforce practices on what have traditionally been non-mining communities are revealing. While mining jobs and FIFO in particular remain a relatively small component of these local economies, there was a general recognition that they are of growing importance. Moreover, there was a sense that the economies of these communities was linked to the fortunes of the resource sector in more direct ways than has perhaps been the case in the past. These connections were expressed largely in terms of the wages earned in mining regions and then spent within the local economies, and of course through the spatial redistribution strategy associated with the Royalties for Regions policy. In broad terms, the negative social consequences of FIFO reported in other studies were not raised as major issues to nearly the same extent amongst participants in this research.

There is, however, a need for some caution. The components that emerged from the Q-sort only account for around 36 per cent of the variability in the data. So while the components that were drawn out were significant, the results point to a degree of ambiguity in the responses. This is not surprising given that these communities have only been FIFO source communities for a relatively short period of time (around 10 years), and that it is not a major component of the local labour force or economy. Moreover, these towns have not been as profoundly impacted by FIFO as some host communities, which could contribute to a greater diversity of opinion on the likely impacts. Indeed, there was a sense in both the Q-sort and the interviews that participants were trying to anticipate future impacts, rather than report on present ones. This may mean that views within the communities are not particularly ‘settled’ or polarised when compared with other stakeholders with more direct experience of FIFO. Indeed, in undertaking fieldwork in Albany, Geraldton and Northam it was clear that some stakeholders were not certain of the extent or impact of FIFO practices.

Notwithstanding the specific context and ambiguity in the results, the findings raise a number of important themes, particularly in terms of regional policy. At a broad level, the
perspectives offered by stakeholders in the case study centres tended to focus on the potential benefits associated with engaging with the resource sector ‘at a distance’ and through FIFO. This practice helps inject additional economic activity into non-mining regions, as well as adding to economic diversity, increasing employment opportunities, and helping retain and even attract population. Indeed, these regional centres offer the sorts of amenity attributes described by Argent et al. (2014) in their studies of rural population growth and economic transformation, such as proximity to the coast, scenic agrarian or natural landscapes, and heritage environments. This offers FIFO workers the opportunity to live in high quality amenity environments, while working on remote minesites. McKenzie et al. (2014) identify another dimension to this associated with employment flexibility, which is particularly important in sectors as volatile as mining. This was illustrated in the case of Ravensthorpe in Western Australia where a new mine was accompanied by the build up of a large residential labour force (see Pini et al., 2010). The temporary closure of the mine caused considerable economic and social stress for those who had moved to the town and then lost jobs or saw business contract. FIFO can mitigate against this by enabling workers to more easily seek work on other minesites without having to relocate.

The economic and workforce implications are, of course, coupled with a range of social impacts associated with FIFO. These were also viewed in a largely positive way by participants in the study. While there was a recognition that roster systems had the potential to have a direct impact on local organisations, such as sporting clubs, churches and volunteer groups, it was also noted that FIFO helps to retain families in local communities, and in some cases, results in growth that helps to strengthen these social institutions. What was rarely discussed, however, were the mental health and wellbeing issues facing workers and their families that have been raised in other studies (Barclay et al., 2013; Torkington et al., 2011). These issues remained notable silences in the discourse, and are in need of further investigation.

One of the overarching themes to emerge both from the Q-sort and the discussions with participants was the role of public policy. Prominent here were views linked to long-term strategic planning and regional development policy. In an earlier paper, we noted that residents in the town of Onslow often felt overwhelmed by scale and pace of development, and frustrated by the inability of planners to anticipate and cope with rapid resource-led development (Chapman et al., 2014). Yet, in the towns studied here, quite a different set of views emerged that were more optimistic and complementary of strategic planning and
regional policy. There is little doubt that a key difference here is that these centres were not affected by the resource boom in the same way as Onslow, given that they are sources of labour rather than sites of extraction. Moreover, they have a greater degree of economic and social diversity. Despite this, there was a general view that the Royalties for Regions scheme in particular had been effective in redistributing the benefits of the mining industry across regional Western Australia, and had resulted in improvements to infrastructure and services. Yet there were some concerns raised about the ability of local authorities in particular to plan for growth (or decline) in response to economic and other events well removed from the local area. This raises broader questions about the extent to which regional policy and planning adequately recognises the sorts of spatial interdependencies and complexities raised in this paper.

The ways in which the mining industry is, more than ever it would seem, impacting on communities far beyond the areas in which extraction takes place emphasises the need to move beyond traditional notions of regions that tend to view these as ‘containers’ of economic activity and labour (see Hall, 1992). Rather, regions need to be conceived within the regional planning process as being constituted by multi-scalar networks and flows that transcend the boundaries of the State’s administrative regions. This challenges the notion of what constitutes a ‘functional’ region. Functional regions have traditionally been characterised by an internalised labour market and economic consistency and delineated by commute-to-work patterns (Glasson and Marshall, 2007). Additionally, both functional and administrative regions are generally contiguous. As the flows of labour and capital within the State become increasingly mobile, these delineations become increasingly less relevant. Accordingly, planning in a way that incorporates spatial complexity and interdependency is becoming increasingly critical, and is particularly important in those places that may be affected by the cycles in the resource sector ‘at a distance’. Thus, the planning and policy strategies that incorporate centres such as Albany, Geraldton, and Northam need to be cognisant of the dynamics of change affecting regions such as the Pilbara and the Goldfields.

While long-term strategic planning was generally held as adequate within the study communities, when the spatial interdependences outlined above are incorporated, it remains an area demanding policy priority. Resource industries typically experience an economic cycle (see Tonts, 2010) that can have a dramatic impact on both communities involved in extraction, and those involved in providing labour. While local and/or State level planning
has little influence or insight into future global commodity prices, considering the inevitability of these cycles when developing long-term policy could minimise the magnitude of both the boom periods and the bust periods. Current regional planning approaches are largely reactive to market conditions, rather than focused on building longer-term resilience. This is particularly important not just in places involved in extraction, but also in those places dependent on extraction, such as communities hosting growing numbers of FIFO workers.

7.7 Conclusion

This paper has pointed to a growing level of economic and social integration between mining activities and towns that have traditionally had little direct involvement in resource extraction. In doing this, it has also emphasised that FIFO should not be viewed simply as an economic and workforce interaction between large metropolitan regions to remote mining sites. For the participants in this study, the overwhelming view of FIFO was that it added economic activity and employment opportunities to source communities, with relatively few negative social or other impacts. While there certainly appear to be economic and social opportunities associated with FIFO, there is also a need to be circumspect at this stage, given that the number of people involved is so far relatively small and that the practice is not longstanding in these places. More research on the ‘actual’ impacts, rather than the perceptions of impacts as outlined here is needed. What is clear is that FIFO has contributed to a growing levels of complexity in the spatiality of the State’s economy, and that these inter-linkages and flows are not yet fully understood in economic, social or demographic terms. From a regional policy perspective, both understanding and accounting for these inter-linkages are important in ensuring that the strategic planning for the future needs of regional communities is effective.
Chapter 8: Conclusion

8.1 Introduction

One of the common themes in the literature on resource economies is the ways that localities are impacted by forces beyond their control. This is a result of the complex nature of the integration of their local economies into the global economic structure (Bradbury, 1979; Bridge, 2008; Gibson, 1990). The purpose of this thesis has been to further the understanding of the implications that rapid resource-led development has recently had in Western Australia. This includes not simply understanding how places are impacted, but how they respond and adapt. To this end, the thesis addressed five key objectives:

i. To understand how governments respond to rapid resource-led development, particularly in terms of the provision of key services and infrastructure.

ii. To examine local residents’ experiences and perceptions of rapid resource-led development, and to consider how and why these vary between communities.

iii. To explore temporal and spatial variability in socioeconomic performance across a selection of mining towns and to identify factors that contribute to this variability.

iv. To examine the role of local competitiveness in shaping the temporal and spatial variability in the economic development of mining towns.

v. To assess how the rapid growth of mining is impacting communities that traditionally have had little or no historic involvement with the mining industry.
These objectives were addressed through a series of papers, which collectively examined a number of themes relevant to contemporary conceptual, empirical, and policy debates. In broad terms, the thesis contributes to an emerging body of Australian literature on resource towns, which has been largely overlooked until relatively recently. In many respects, the findings of the papers presented here challenge the literature that points to resource towns as being little more than places of social dislocation and upheaval (Carrington and Pereira, 2011; McIntosh, 2012; Scott et al., 2012). This was also a criticism of the early North American boomtown literature, which was pervaded by what Smith et al. (2001) describe as alarmist accounts of dislocation and dysfunction (see also Brown et al., 1989; Wilkinson et al., 1982). Instead, the Australian situation is characterised by a quite nuanced set of processes and outcomes that vary enormously from place-to-place. As Nord and Luloff (1993) pointed out for the United States, resource towns are highly heterogeneous in social, economic, demographic, and policy terms (see also Hajkowicz et al., 2011; Petkova et al., 2011; Tonts et al., 2012). Moreover, as Smith et al. (2001) point out, rapid growth is often followed by periods of adjustment, adaptation, and transformation (see also Brown et al., 2005; Halseth, 1999a). This draws attention to two of the critical themes that emerge from this work - the influence that space (and place) and time have when it comes to understanding mining towns. Space, in particular, was relevant not just in terms of the geographically variable performance of mining towns, but because of their interactions and interdependencies with other places, and the ways in which policy responses need to account for particular spatial contexts (Bradbury, 1979; Bridge, 2008; Henderson et al., 2002). The remainder of this chapter reflects on the key themes to emerge from the research: i) spatial variability of impacts and responses; ii) temporal variation in resource impacts; iii) spatial interdependencies between places; and iv) considerations that these findings should raise for policy-makers.

8.2 Spatial Variation of Impacts and Responses

The growing integration of Western Australian resource towns into the global economy has had demonstrable impacts on social and economic conditions at the local scale (AEC Group, 2012; Altman, 2003). Expanding global networks and increasing interdependencies between places means that these local economies are increasingly affected by conditions beyond their control (see also Gramling and Freudenburg, 1990; Hayter et al., 2003; Randall and Ironside, 1996). In some cases this brings positive impacts, such as investment and employment, to communities as resource companies are often required to invest in the
regions in which they operate (Chesire et al., 2011). Additionally, there is the potential benefit that the growing population will spur growth in other sectors (Argent, 2013; Fleming and Measham, 2014). However, the interconnected nature of the globalised economy also leaves communities exposed to the volatilities of global economic conditions, subject to changing policy and funding arrangements, and susceptible to investment and operation decisions made external to the community (McDonald et al., 2012; Tonts et al., 2012; Wilson, 2004). The ways in which communities are affected varies greatly from place-to-place, as it is influenced by the physical nature of the resource, the way a locality is integrated into the global economic structure, and the unique local social and economic attributes (Nord and Luloff, 1993; Petkova et al., 2007; Rainnie et al., 2014). These factors affect the capacity of individual communities to adapt to rapidly changing economic conditions.

This is evident in the recent rapid expansion of resource industries in Western Australia. The mining boom was largely due to growing demand from Asia, which drove up international prices and served as the predominant destination for Western Australian exports (DMP 2012; Garnaut, 2014; Gregory, 2012). As a result of these global forces, many mines across the State expanded production and numerous new mineral and energy operations were constructed. Investment and operational decisions were typically made by multinational corporations, which are headquartered in major Australian and international cities (Tonts and Taylor, 2010). The spatial disconnect between the centralised areas of concentrated power and the decentralised areas of resource production demonstrates the typical relationship between the geographical ‘core’ and the resource ‘periphery’. This reflects observations by Innis (1956), Barnes (1999) and Hayter et al. (2003) of extra-local forces driving settlement patterns and economic growth (see also Gunton, 2003; Markusen, 1996; McCann, 1998). As a result, localities retain very little control over their own economic and social development. They are treated as regions from which resources are to be extracted for the benefit of the metropolitan core (Markey, 2008; Tonts et al., 2013). The spatially interconnected nature of the contemporary resource economy in Western Australia has resulted in core regions asserting their power over both mining and non-mining towns across the State (Argent, 2013; Rainnie et al., 2014). The investment and operational decisions made in these centralised localities directly and indirectly affect other, more decentralised, areas of Western Australia.
Both the statistical analysis and primary data collection within this thesis revealed how local attributes affect the ways that communities experienced and adjusted to the rapid expansion of the mining sector. In some localities, favourable local conditions contributed to higher levels of socioeconomic wellbeing (Chapter 5) and led to increased economic competitiveness (Chapter 6) (see also Plummer et al., 2014; Tonts et al., 2012). In these places, local characteristics and conditions are able to withstand, adapt to, or, indeed, enhance the impacts that changing global economic conditions brings on the community. The extent to which a community benefits from their unique local characteristics creates spatially variable impacts, contributing to the heterogeneous experience of mining towns (Hajkowicz, 2011; Nord and Luloff, 1993; Tonts et al., 2012). The ways in which global economic processes ‘touched the ground’ in these localities varied over time and did not always affect the communities in the ways that would be predicted by the literature. An example of this can be seen in the unexpected positive relationship between welfare expenditure per capita and income (Chapter 5). Although it does not align with most resource town literature (see Freudenburg, 1992; Stedman et al., 2004), it points to the possibility of the ‘paradox of plenty’ (Langton and Mazel, 2008), where there is extreme poverty amongst abundant resource wealth. This highlights the complexity that multi-scalar integration introduces to the local economic context.

Unfortunately, not all communities possess attributes that contribute to growth (Hassink, 2010; Kotev and Rolfe, 2014). Some communities experienced decreased socioeconomic wellbeing and diminished competitiveness over the mining boom period. Places with unfavourable conditions experienced negative impacts or were unable to respond to the dynamism of global economic conditions (e.g. Bender and Stinson, 1984; Gilmore and Duff, 1975; Haslam-McKenzie and Rowley, 2013). This is clearly demonstrated in the divergence in employment growth rates from 2006 to 2011 (Chapter 6). The boom brought higher rates of employment growth to some communities, but caused others to lag further behind. This supports some of the literature that finds resource dependence to be detrimental to long-term local economic development (Freudenburg, 1992), but only portrays a very generalised, ‘one-sided’ story. The combination of place-specific characteristics work in concert with broader global processes to shape a geographically diverse socioeconomic and economic landscape (Coe et al., 2004; Yeung, 2015). As a result, spatially uneven levels of development have occurred across the State (Beer, 2012; Stimson et al., 2009; Tonts et al., 2012).
The specific local context also shapes how resource development is experienced by the residents within these resource towns. Some communities have had positive experiences with the introduction or expansion of mining. For those communities, the mining industry has met their need for jobs, increased services, and infrastructure (Chesire, 2010; Manteaw, 2008; Reeson et al., 2012). The negative social consequences encountered in other mining towns were experienced in varying degrees and, in some cases, the positive economic, material, and social benefits were perceived to outweigh the negative impacts (Chesire et al., 2011; Petrova and Marinova 2013). This was noted in Onslow, where the negative impacts of the mining industry were widespread, but many residents felt that it would bring benefits in the long-run (Chapters 3 and 4). They also felt that many of the negative impacts could have been minimised with a more timely response from the government (Chapter 3).

Capital investment in a community is often used to mitigate the negative impacts that mining has on a locality. Assessment of the necessary investment in a community is often done on an ad hoc basis, depending on the specific needs of that locality and the capacity and willingness of the company and government to invest in a specific region (Chesire, 2010; Labonne, 1999). Determining the levels of investment on a case-by-case means that there is not a uniform level of investment into all place, resulting in variable benefits being experienced across resource communities (Esteves, 2008; Esteves and Vanclay, 2009). It also has the potential to be ineffective and/or exacerbate existing tensions between the community and the resource company if funding does not actually address the community’s needs (Bice, 2013). Although Onslow (Chapter 3) experienced large amounts of very visible, direct investment, such as a new recreation centre, residents were still experiencing negative impacts of mining through insufficient housing and poor quality of essential infrastructure (Haslam-McKenzie and Rowley, 2013; Weber and Howell, 1982). On the other hand, some places may experience the negative impacts of mining without the positive economic, material, or social benefits brought with investment. Although the economy of Karratha (Chapter 4) is very resource-dependent, many residents were resistant to the expansion of the mining industry because they did not feel that the community experienced sufficient benefit. These variations contribute to spatially variable levels of development and shape the experiences of residents undergoing the economic transition (Esteves and Vanclay, 2009). The perceptions and motivations of differential levels of funding is beyond the scope of this thesis, but could serve as an area of future research as it further explores the dynamics of political power, influence, and leadership between communities and the globalised economy.
Along with the balance between positive and negative impacts, local history and social or political characteristics may affect the capacity and way in which a community responds to changes in structural conditions (Behrisch, 1995; Gramling and Freudenburg, 1990; Martin and Sunley, 2006). The nature of the relationship between a community and extractive industries may influence local culture, discourse, and identity. These define local priorities when dealing with major economic and social transitions (Halseth, 2005). In communities where mining has historically been a significant component of the economy, the emphasis may be on increasing or preserving local employment (Dennis et al., 1956; Garnett, 2012). On the other hand, traditionally non-mining communities may experience and promote more peripheral benefits, such as increased economic activity in tertiary sectors (Auty, 1990; Fleming and Measham, 2014). The local history and social and political attributes of a community create the unique framework within which the variable impacts of mining development play out. It, therefore, adds another layer of complexity in understanding the ways in which communities respond to dramatic economic change. Despite the impacts that this can have at the community scale, these local priorities are of little concern to the higher levels of power and control beyond these resource peripheries (Massey, 1984; Tonts et al., 2013).

8.3 Temporal Variation of Resource Impacts

The challenges of addressing the unique circumstances of resource communities are exacerbated by the dynamism of global economic conditions. This study reinforces the findings of others that discuss the ever-changing nature of resource economies (e.g. Bradbury and St. Martin, 1983; Halseth, 1999a, b; Lucas, 1971). In early boom periods, the introduction of mining to a non-mining community may create high expectations of the benefits that it will bring to the region (Auty, 1998; Petrova and Marinova, 2013). This seemed to be the case in Onslow, where many people discussed the positive impacts that mining would have on the community in the future, despite the negative effects they reported experiencing at the time (Chapter 3). Communities with a long history of mining would have endured the fluctuations in local conditions in the past and may recognise the ephemeral nature of that period of growth (Ryser et al., 2014). On the other hand, the expectation that booms and busts will occur indefinitely may perpetuate the expectation that the jobs and economic conditions of the town will always recover, despite diminishing reserves or unfavourable economic conditions (Behrisch, 1995; Freudenburg 1992; Halseth, 1999b). This would hinder the efficient response of a community to dynamic economic
environment. Whether it is during growth or constriction, with rapidly changing conditions comes uncertainty of the community’s future needs and development priorities (Halseth, 2005; Maude and Hugo, 1992).

In addition to the challenge of coping with volatile global conditions, the interaction between the global economy and the local context changes over the course of the boom. Communities are highly affected in the initial periods of the boom (Gilmore, 1976; Halseth, 1999a), largely through employment in the construction industries to build or expand operations. Once approval is obtained, the construction of resource operations occurs very efficiently, drawing on massive pools of mobile labour. Improvements to increase local capacity to accommodate this influx of people often occurs on a much slower timeline, hampered by competing priorities of government agencies, negotiations about funding, or simply the overwhelming scale of need (see also Brown et al., 2005). While global economic conditions may continue to ‘boom’, through high value and demand for resources, the dramatic impacts on the local scale diminish over time. As operations move from the construction to the operational phase, they require a smaller labour force and may diminish some of the high levels of economic and social volatility being experienced at the local scale.

For competitive communities that are able to capture the benefits of the boom, the highly dynamic construction period could offset the dramatic impacts experienced in the initial growth periods and allow communities to benefit in a time when they may otherwise be experiencing the greatest level of local disruption (Coe et al., 2004). On the other hand, for communities that do not have the capacity to adapt to these booming conditions, it reinforces negative impacts and leads to a period of decreased quality of life while they attempt to identify and meet their changing needs (Brown et al., 1989, 2005). This is evident in Western Australia in the divergence in employment during the height of the boom (Chapter 6). The competitive towns with the highest initial levels of employment growth experienced even greater levels of growth, while the others lagged further behind. The dynamic interaction between the community and global economy over the period of the boom creates the additional challenge of uncertainty in preparing the community for the future. The dynamism of the initial period makes it difficult to assess the infrastructural, service, and social needs of the 'post-boom' community.
During the construction stage, the scale and pace at which new projects are implemented often overwhelms local political abilities to protect the community and deal with changes in a timely manner. This subjects residents to the consequences of development, both positive and negative, without much control over the process causing these impacts (Gramling and Freudenburg, 1990). Local inability to adequately address these impacts further reduces the independence of communities, as they often lack the means to address their new needs. Government funding or investment from companies is often sought to adapt to the changes imposed on the community from external forces (Chesire, 2010; Mantaew, 2008).

Despite the potential upheaval caused at the local scale by changes in global economic conditions, communities are able to adapt over time as their changing needs are identified and addressed (Brown et al., 2005; Gilmore, 1976; Smith et al., 2001). The time needed for this adjustment to occur may vary between communities, contingent on their local adaptive capacity or renewed disruption due to further industrial expansion.

### 8.4 Increasing Spatial interdependencies

Underlying the multiple causes for spatial and temporal variation across mining towns are the interdependencies between places created by global networks of production (Bridge, 2008; Coe et al., 2004; Rainnie et al., 2014). Resource extraction relies on these globalised networks, which expand with growing transportation technologies. As production becomes more mobile, it connects different localities through the functions that they serve in the production process. However, at the foundation of these processes is resource extraction, which is spatially-fixed to the location where the resource is available (Freudenburg, 1992). The mining towns in these regions anchor trans-national production networks in ‘real’, tangible places (Coe et al., 2004; Yeung, 2015). As a result, these globalised networks shape aspects of development and socioeconomic performance at the local scale.

Changes in global conditions affect all communities within that network, but the ways in which it does so vary from place-to-place (Coe et al., 2004; Tonts et al., 2012). The impacts experienced in Western Australian mining towns were the 'grounded' effects caused by the reverberations of Chinese demand throughout these networks of interdependencies. This study has drawn attention to the various ways that communities experience and respond to a uniform, wide-scale change in economic conditions. While Chinese demand drove the
global price for certain commodities, the extent to which this affected individual places varied and the experiences within each place was unique. Furthermore, over the period of the boom, sustained demand from China continued to drive up the value of output (DMP, 2014; Garnaut, 2014; Gregory, 2012). For Western Australia, the decisions were made in metropoles and introduced the implications of these globalised economic forces to the State's peripheral resource extraction region. The boom also saw much of the wealth generated in these resource areas accumulate in centralised localities (Eggert, 2002; Rolfe et al., 2007; Tonts et al., 2013). This is apparent in the current economic condition of the State, as the value of mineral output continues to rise while operations in resource towns are experiencing widespread job losses (Hageman, 2015; Klinger, 2015).

The growing interdependencies are now incorporating places that are not intentionally pursuing economic activity in the mining sector. Having a mobile labour force is an asset that provides increasing flexibility in production. This incorporates communities into the global networks through mining, despite the fact that mineral extraction is not actually occurring locally (Haslam-McKenzie and Hoath, 2014; O’Connor and Kershaw, 1999). While in the past these places could be considered independent of these production chains, as mining becomes a growing component of the local economy, these localities lose their independence and become more closely integrated into these global networks. This introduces many of the vulnerabilities faced by mining towns and increases their susceptibility to changes in global conditions. This was seen in the towns of Albany, Northam, and Geraldton (Chapter 7). Residents participating in the fly-in/fly-out labour force expose these communities to the conditions of the global economy. Although these places are spatially displaced from the economic activity, they are functionally integrated into the mining production process.

Being functionally integrated but spatially distant from mining activity contributes to a growing level of complexity in the spatiality of the economy. It also contributes to uneven development, as it creates a new type of relationship between local and global economic structures. This affects how non-mining localities are influenced by changes to the global economic structure and the ways in which they can adapt.
8.5 Considerations for Policy-makers

The variability in the ways that communities are impacted by, and respond to, changes in global economic conditions needs to be considered when drafting development policy. Previous research has identified many of the negative impacts that resource development can bring to communities, such as decreased sense of safety, a growing prevalence of social problems, insufficient housing, inadequate services and infrastructure, income inequalities, and negative impacts on Aboriginal communities (Gilmore and Duff, 1975; Goldenberg et al., 2010; Greider and Krannich, 1985; Kohrs, 1974; Scott et al., 2012). The knowledge of these potential impacts and the long period of planning and approvals prior to construction provide an opportunity for policy-makers to determine the probability of these impacts, and develop and implement place-specific mitigation strategies. Additionally, these impacts are often the result of decisions made external to the community. As such, there are some considerations that should be taken into account when devising policy to address resource-led growth. Specifically, policy should be adaptable; policy should be dynamic; and policy should make communities and residents feel empowered.

Taking the local context into account can help in devising the best way to shelter communities from the volatility of the global structure. Policy should therefore be adaptable to the specific needs and circumstances of the locality in which it is applied. The apparent spatial variability across mining towns demonstrates that a ‘one-size-fits-all’ policy of development is ineffective. The specific context and ways in which globalised economic activity is integrated at the local scale affects the capacity of that locality to respond. Accordingly, policy should provide an adaptable framework within which specific local needs and impacts can be addressed.

One of the most significant factors contributing to variability in impacts is the dynamism of global economic structure and the cyclical nature of resource development. Policy should, likewise, be dynamic to address changing conditions. The ways in which communities are affected by the global economy are always evolving. As such, the responses of policy-makers and resource companies to address such changes also need to adapt. Furthermore, policy should be implemented at a time when it would be most effective in mitigating negative impacts and maximising benefits. This would likely require a greater level of government investment into communities that is not contingent on project approval. The time lag between project approval and meeting community needs could also be addressed.
by delaying the start of the project until after community infrastructure and service improvements have begun. Implementing a policy that is dynamic would allow it to address the changing needs of the community throughout all stages of resource development.

Finally, policy should make communities and residents feel empowered that they can retain some local authority over their local economic conditions and development. The amount of local control and capacity that communities possess to respond to the changes introduced by integration into the global economy influences local experiences of resource-led development. Although individual communities cannot control global economic conditions, they should feel that they are able to respond and adapt to the ways that it affects local conditions. Policy should, therefore, enable and empower communities to retain some local control over their own economic wellbeing.

8.6 Conclusion

This study has demonstrated how resource communities experience impacts that vary over both space and time. In some circumstances, local communities benefit from greater integration into global economic process. For these places a resource boom brings jobs, investment, new infrastructure, and services. In other situations, some of the negative impacts of resource-led development identified in previous research are still evident. These include issues of housing shortages (Haslam-McKenzie and Rowley, 2013), inadequate services and infrastructure (Rolfe et al., 2007), dramatic rise in cost of living (Haslam-McKenzie et al., 2009), and social inequality (Fleming and Measham, 2015; Reeson et al., 2012). However, these negative impacts should not be accepted as either inevitable outcomes of resource-led growth or as being uniform in their impact. This thesis has demonstrated that variability in economic and social performance across time and space is common amongst mining towns, and that they do tend to adjust to changing circumstances over time. One of the critical lessons for policy-makers and planners is that policy responses that are delayed, piecemeal, or assume that ‘one-size-fits-all’ typically have limited efficacy and can hinder adjustment processes and impact on local economic and social wellbeing. Ongoing inquiry into how resource-dependent communities respond to changes in broader economic conditions can better enable companies, communities, and governments to cope with these impacts in the future.
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Murphy, M. 2012. Map drawn by Mary Murphy using ArcMap 10.2.2. Data Source: Australian Bureau of Statistics.

Murphy, M. 2014. Map drawn by Mary Murphy using ArcMap 10.2.2. Data Source: Australian Bureau of Statistics.

Murphy, M. 2015. Map drawn by Mary Murphy using ArcMap 10.2.2. Data Source: Australian Bureau of Statistics.


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PARTICIPANT CONSENT FORM

The Implications of Resource-led Development at Multiple Scales

You are being asked to participate in research which involves ranking statements relating to life in a community characterized by resource-led development. Your responses will be kept confidential and you will not be identified in the results or any publication relating to this research.

The exercise will take approximately one hour.

You have the right to ask questions regarding the objectives and/or methodology of the research at any point.

You have the right to withdraw from the activity at any point or to withdraw your responses from the final amalgamation of data once the exercise is complete, up to the point of publication.

Approval to conduct this research has been provided by The University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time. In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Research Ethics Office at the University of Western Australia on (08) 6488 1610, or (08) 6488 3703, or by emailing to hreo-research@uwa.edu.au.

I have read and understood the above statements. I understand what is expected of me and agree to participate in this research.

_________________________  ______________________
(name)            (date)

_________________________
(signature)

Rachel Chapman            Dr Matthew Tonts
Masters Student, UWA            Chief Investigator/Supervisor
Appendix B: Survey of demographic information

<table>
<thead>
<tr>
<th>Name:</th>
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<tbody>
<tr>
<td>Age:</td>
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<tr>
<td>☐ 45-49</td>
<td>☐ 50-54</td>
</tr>
<tr>
<td>Gender:</td>
<td>☐ Male</td>
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<tr>
<td>Community of residence:</td>
<td></td>
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<tr>
<td>How long have you lived in your community of residence?</td>
<td></td>
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<tr>
<td>☐ Less than 1 year</td>
<td>☐ 1-2 years</td>
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<tr>
<td>What last three places did you live prior and for approximately how long?</td>
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</table>

<table>
<thead>
<tr>
<th>Community</th>
<th>Length of residence</th>
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| Occupation: |  |
| ☐ Clerical and Administrative Worker | ☐ Manager |
| ☐ Community and Personal Service Worker | ☐ Professional |
| ☐ Labourer | ☐ Technician and Trades Worker |
| ☐ Machinery Operator/Driver | ☐ Sales Worker |

| Industry Sector of Employment: |  |
| ☐ Agriculture, Forestry and Fishing | ☐ Manufacturing |
| ☐ Accommodation and Food Services | ☐ Mining |
| ☐ Administrative and Support Services | ☐ Professional, Scientific and Technical Services |
| ☐ Arts and Recreation Services | ☐ Public Administration and Safety |
| ☐ Construction | ☐ Rental, Hiring and Real Estate Services |
| ☐ Education and Training | ☐ Retail Trade |
| ☐ Electricity, Gas, Water and Waste Services | ☐ Transport, Postal and Warehousing |
| ☐ Financial and Insurance Services | ☐ Wholesale Trade |
| ☐ Health Care and Social Assistance | ☐ Other Services |
| ☐ Information Media and Telecommunications |  |
Appendix C: Themes and questions for semi-structured interviews

Personal
Do you see yourself living here indefinitely?
Do you think this is a good place to live?
What do you like about living here?
What do you dislike about living here?

Environment
Do you feel that the resource companies do a good job of protecting the environment?
Can environmental protection and resource development occur simultaneously?

Economy
Other than resource development and support industries, what other economic options are there in this community?
What do teenagers do for work here?
Are there enough jobs for locals?
Is it easy to find a job?

Services
Has service provision changes with the economic boom?
Do you get adequate service provision here?
What services are you missing or need substantial improvements?

Decisions
Do community members have much say in development proposals or projects?
Are the opinions of community members listened to?
Do you think involving community members in decisions makes this a better place to live?

Aboriginal Population
How to you think resource projects are impacting Aboriginal populations?
Do you think they have the right to prevent a project to preserve their cultural heritage?

Other
Do people here care about the long-term wellbeing of the town?
Do resource companies care about the long-term wellbeing of the town?
Do you think major projects improve life within the community?
Appendix D: Q-sort themes and statements for Karratha and Onslow

ECONOMIC DIMENSIONS

Economic Benefits
Resource-led development brings “initial growing pains” but creates great economic opportunities in the long-term.

Resource-led development provides crucial education, training and employment opportunities for remote communities.

Equality of Benefits
Large-scale projects benefit the government more than the local community.

Large-scale resource projects provide economic benefits that are spread amongst all community members.

Local Jobs
Local workers are being passed over in favour of a FIFO workforce.

There are not enough local workers to fill the jobs available.

FIFO is necessary for new large scale projects to succeed.

Community Economic Future
The proposed development represents the progress necessary to keep the country going.

Once the resources are gone, this will become a ghost town.

Large-scale development provides enough long-term jobs that we don’t need to worry about economic diversification.

Boom
Large-scale development provides enough long-term jobs that we don’t need to worry about economic diversification.

While resources are booming, our community should be investing in developing non-resource related industries.

Government support and investment for non-resource related industries is evident in this community.

SOCIO-ECONOMIC DIMENSIONS

Community
A large influx of workers contributes to social upheaval and a range of social problems.

New developments will ultimately lead to more diverse, interesting and liveable community.

I see a need for this project in my community.
Cost of Living
The cost of rental accommodation is being made unaffordable by major new projects.
New developments are contributing to the increasing the cost of groceries and other goods.
The cost of living is a barrier to participation in community organizations and events.

Cost of Living Impacts
Housing and rent prices do not affect economic diversification.
Accessible housing is a key issue in attracting and retaining workers for non-resource related industry and services.

Wages
Wages have sufficiently increased in all sectors to compensate for the high cost of living.
It is difficult for local businesses to retain employees due to high wages in the resource sector.
There is an increasing divide between the incomes earned in the resources sector and those earned in other sectors.

Social Impacts of FIFO
A FIFO workforce is detrimental to our sense of community.
FIFO is often unfairly blamed for common household and social problems.
A dramatic increase in population from an influx of workers makes this a safer community.

Economic Impacts of FIFO
FIFO workers do not spend money in the community in which they work.
A FIFO workforce directly benefits local businesses.

POLICY RELATED (CONSULTATION, REINVESTMENT AND REGIONAL DEVELOPMENT)
Traditional Owners
Consultation with traditional owners has little actual impact on the development process.
Aboriginal communities get little direct or indirect benefit from large resource projects

Consultation and Local Involvement in Decision Making
Many decisions regarding development have been made without consulting the local community.
Local residents have the best knowledge about community needs.
All local residents have had the opportunity to voice their opinions about the proposed development.
Environment vs Economy
Providing jobs is more important than environmental sustainability.

Preserving the environment is important for community sustainability and economic diversification.

Infrastructure and Services
Adequate amounts of government revenue earned from this region are being reinvested in the region.

Resource companies should contribute to community development and improving local infrastructure.

There has been a noticeable improvement in community infrastructure and provision of services due to resource-led development.

The proposed development will bring necessary long-term planning for infrastructure and services provision.

Reinvestment
The Royalties for Regions scheme has had a positive impact on this community.

The State government is responsive to the development issues facing this community.

The Commonwealth government is responsive to the development issues facing this community.

Local government will be able to respond to development pressures associated with new resource projects.
Appendix E: Hardcopy Q-sort used in Karratha

Instructions

Hi,

Thank you for agreeing to participate in this study. It will take about 20 to 30 minutes to complete.

This is called a Q-sort exercise and involves ranking statements relating to community development based on how much you agree or disagree with them. Where you rank the statements is based on your own personal opinions and experiences. These statements were collected from newspaper articles, letters to the editor, and comments from online articles and represent the opinions of individuals living in regional areas of Western Australia. The results will allow me to see what issues people in your community feel most strongly about and what groups of people (e.g. business owners, long-term residents etc) share similar opinions.

Two scales are provided, one with a template and one without. To complete the exercise, read through the statements, writing the corresponding number along the scale without the boxes, based on how much you agree or disagree with the statement.

Once you have read all the statements, select one that you feel most strongly about (i.e. one that you completely disagree with or completely agree with) and write the statement number in the box on the far left or far right, as appropriate. Work your way towards the middle of the chart, with the statements that you don’t feel as strongly about closer towards the middle. Each box can only contain one statement number.

Feel free to include any written notes or thoughts regarding the statements on the back of the response sheet or to contact me if you have any questions. Please also remember to sign the consent form and fill out the basic demographic information.

I will return to collect the survey on ____________________________ at __________.

Thank you for your participation.

Rachel

M: 0451 982 225
E: rachel.chapman@uwa.edu.au

Example: (the placement of these numbers is for example only and does not reflect the opinion of the researcher)
List of numbered statements

Statements

1. Resource-led development brings “initial growing pains” but creates great economic opportunities in the long-term.
2. Once the resources are gone, this will become a ghost town.
3. Providing jobs is more important than environmental sustainability.
4. Aboriginal communities get little direct or indirect benefit from large resource projects.
5. The State government is responsive to the development issues facing this community.
6. Local workers are being passed over in favour of a FIFO workforce.
7. New developments will ultimately lead to more diverse, interesting and liveable community.
8. The cost of living is a barrier to participation in community organizations and events.
9. There has been a noticeable improvement in community infrastructure and provision of services due to resource-led development.
10. Resource-led development provides crucial education, training and employment opportunities for remote communities.
11. Large-scale development provides enough long-term jobs that we don’t need to worry about economic diversification.
12. Resource companies should directly invest in community development and improving local infrastructure.
13. FIFO workers do not spend money in the community in which they work.
14. Many decisions regarding development have been made without consulting the local community.
15. The proposed development will bring necessary long-term planning for infrastructure and services provision.
16. Local government will be able to respond to development pressures associated with new resource projects.
17. Local residents have the best knowledge about community needs.
18. The proposed development represents the progress necessary to keep the country going.
19. It is difficult for local businesses to retain employees due to high wages in the resource sector.
20. Accessible housing is a key issue in attracting and retaining workers for non-resource related industry and services.
21. FIFO is necessary for new, large scale projects to succeed.
22. Large-scale projects benefit the government more than the local community.
23. All local residents have the opportunity to voice their opinions about the proposed development.
24. There is an increasing divide between the incomes earned in the resources sector and those earned in other sectors.
25. Wages have sufficiently increased in all sectors to compensate for the high cost of living.
26. The Commonwealth government is responsive to the development issues facing this community.
27. Housing and rent prices do not affect economic diversification.
28. A FIFO workforce directly benefits local businesses.
29. Large-scale resource projects provide economic benefits that are spread amongst all community members.
30. While resources are booming, our community should be investing in developing non-resource related industries.
31. New developments are contributing to increasing the cost of groceries and other goods.
32. Government support and investment for non-resource related sectors is evident in this community.
33. A FIFO workforce is detrimental to our sense of community.
34. There are enough local workers to fill the jobs available.
35. The Royalties for Regions scheme has had a positive impact on this community.
36. Consultation with traditional owners has a significant impact on the development process.
37. A dramatic increase in population from an influx of workers make this a safer community.
38. New large-scale projects contribute to social upheaval and a range of social problems.
39. I see a need for further resource development in my community.
40. The cost of rental accommodation is being made unaffordable by major new projects.
41. Adequate amounts of government revenue earned from this region are being reinvested in the region.
42. Preserving the environment is important for community sustainability and economic diversification.
43. FIFO is often unfairly blamed for common household and social problems.
Appendix F: Q-sort statements used in Albany, Geraldton and Northam.

1. The resource boom in Western Australia is positively affecting local economic activity.
2. Western Australia’s mining and petroleum industries do not affect this community.
3. It is difficult to attract professionals or public sector workers to live in the community.
4. Businesses have been leaving the community because of increased operating costs.
5. Neighbouring communities provide the goods, services and amenities that are unavailable in this community.
6. WA’s resource sector has contributed to a noticeable improvement in local infrastructure and provision of services.
7. There has been a noticeable increase in the number of FIFO workers living here.
8. There has been a notable increase in economic activity within the community.
9. Large-scale resource projects provide economic benefits that are spread amongst all regional communities.
10. There are not enough workers to fill available jobs around town.
11. It is difficult for local businesses to retain employees due to high wages in the resource sector.
12. A FIFO workforce is detrimental to our sense of community.
13. FIFO is often a scapegoat for common social and household problems.
14. A dramatic increase the number of FIFO workers living here makes the community less safe.
15. Providing jobs is more important than environmental sustainability.
16. Preserving the environment is important for community sustainability and economic diversification.
17. Adequate amounts of government revenue are being invested in this community.
18. The Royalties for Regions scheme has had a positive impact on this community.
19. The State government is responsive to the development issues facing this community.
20. The Commonwealth government is responsive to the development issues facing this community.
21. Local government is able to respond to development pressures associated with a change economic environment throughout the State.
22. Extractive industries provide enough long-term jobs that regional areas don’t need to worry about economic diversification.
23. Our community should be diversifying their economy.
24. Government support and investment for non-resource related industries is evident in this community.
25. Many decisions regarding community development are made without consulting community members.
26. Local residents have the best knowledge about community needs.
27. All local residents have the opportunity to voice their opinions about new major industrial developments.
28. The resource industry is driving up the cost of housing in this community.
29. There has been an increase in the cost of groceries and other goods.
30. Housing and rent prices do not affect local economic diversification.
31. Accessible housing is a key issue in attracting and retaining workers to the community.
32. There is an increasing divide between the incomes earned in the resources sector and those earned in other sectors.
33. Wages have kept pace with the changing cost of living in the community.
34. Local businesses are benefitting from an increase in FIFO workforce.
35. FIFO is necessary for new large-scale resource projects to succeed.
36. The growth of the resource sector throughout the state has increased education, training and employment opportunities in this community.
37. Newly available education, training and certification opportunities are not relevant to this community.
38. There is an adequate level of services and amenities in the community.
39. New investments in local infrastructure and services will contribute to detrimental costs in the future.
40. Extractive industries are a good strategy to drive economic growth throughout the State.
41. Benefits from the mining and oil/gas industries are only experienced by the communities where it takes place.
42. WA’s mining boom has triggered long-term planning for infrastructure and services provision in this community.
43. This community lacks a long-term plan to address its growth and development needs.